122-413

TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1886.

No. 298.

THE NEW PROCESS FERMENTATION COMPANY, APPELLANT.

vs.

MAGDALENA MAUS, ALBERT C. MAUS, FRANK A. MAUS AND MATHIAS MAUS.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF INDIANA.

FILED SEPTEMBER 15, 1884.

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1 Pleas of the circuit court of the United States for the district of Indiana, begun and holden at the United States court-house in the city of Indianapolis, on the first Tuesday of May, in the year of our Lord one thousand eight hundred and eighty-four, before the Honorable Thomas Drummond, judge of said circuit court, and the Honorable William A. Woods, judge of the district court of the United States for the district of Indiana, and *ex-officio* judge of said circuit court.

THE NEW PROCESS FERMENTATION COMPANY
v.
MAGDALENA MAUS, ALBERT C. MAUS, CASPER J. MAUS, FRANK A. MAUS, and MATHIAS A. MAUS. } 7060. Chancery.

Be it remembered that heretofore, to wit, at the November term of said court, on the 13th day of December, 1880, before the Honorable Walter Q. Gresham, one of the judges of said court, the following proceedings in the above-entitled cause were had, to wit:

Comes now the complainant by Banning and Banning, its solicitors, and files its bill of complaint herein in the words fol-
2 lowing, to wit:

To the honorable the judges of the circuit court of the United States for the district of Indiana:

"The New Process Fermentation Company," of Chicago, Illinois, a corporation duly organized and existing under and by virtue of the laws of the State of Illinois, and a citizen of the State of Illinois, brings this its bill against Magdalena Maus, Albert C. Maus, Casper J. Maus, Frank A. Maus, and Mathias A. Maus, of the city of Indianapolis, in the State of Indiana, and citizens of the State of Indiana, doing business under the firm name and style of C. Maus, in said city; and thereupon your orator complains and says—

I. That prior to the 30th day of November, A. D. 1876, Leonard Meller, of Ludwigshafen-on-the-Rhine, Bavaria, and Edmund Hofmann, of Mannheim, Baden, Germany, were the original and first inventors and discoverers of a new and useful apparatus and improvement in processes for making beer, for which, upon due application, letters patent were issued by the French and Belgium governments to the said Leonard Meller and Edmund Hofmann, under the name and style of Leo. Meller & Co., dated, respectively, November 30, 1876, and February 28, 1877; that shortly after obtaining said patents the said Meller and Hofmann explained said apparatus and process to George Bartholomae, of Chicago, Illinois, for the purpose and with the intention of introducing the same into this country and obtaining a patent therefor from the United States Government, and to that end and purpose constituted and appointed the said Bartholomae their true and lawful agent and attorney; that thereupon the said Bartholomae immediately introduced said apparatus and process into use at Chicago, Illinois, and took steps to procure letters patent of the United States therefor, but being personally ignorant of and inexperienced in the requirements of the

patent law of the United States, and relying entirely upon the counsel and advice of others in that respect, by inadvertence and mistake he caused the application for such patent to be made in his own name and such patent to be issued to him personally, the same being No. 201,982, dated April 2, 1878; that some time after said patent had been issued the said Bartholomae and the said Meller and Hofmann ascertained that it should have been applied for and issued in the name of the said Meller and Hofmann as inventors and not in that of the said Bartholomae; that thereupon and on the 12th day of February, 1879, and before said invention had been in public use or on sale in this country for more than two years, the said Meller and Hofmann caused an application to be filed in the Patent Office at Washington to secure letters patent of the United States to be issued to themselves, in due form of law, for said apparatus and process; that by an instrument in writing, duly recorded in the Patent Office at Washington before the issuing of the letters patent applied for, as last aforesaid, the said Meller and Hofman, for a valuable consideration, sold, assigned, transferred, and set over to the said George Bartholomae all their right, title, and interest in and to the said invention in and for the whole of the
3 United States, and authorized and requested the Commissioner of Patents to issue the said letters patent when granted to the said Bartholomae as the assignee of their entire right, title, and interest in and to the same, for the sole use and behoof of the said Bartholomae and his legal representatives; that letters patent of the United States, No. 215,679, dated May 20, 1879, in due form were accordingly issued to the said Bartholomae, as the assignee of the said Meller and Hofmann, granting to him, his heirs, administrators, and assigns, for the term of seventeen years from the said 20th day of May, 1879, the full and exclusive right of making, using, and vending to others to be used, the said invention, subject to the limitation prescribed by section 4887 of the Revised Statutes, by reason of the French patent, dated November 30, 1876, and the Belgium patent, dated February 28, 1877, as by reference to said assignment and said letters patent, or certified copies thereof, here in court to be produced, and a copy of which patent is hereto attached and made a part of this bill, will more fully appear.

II. That by virtue of written assignments, given for good and valuable considerations and duly recorded in the Patent Office at Washington, your orator became and now is the sole and exclusive owner of the entire right, title, and interest in and to said letters patent No. 215,679, and in and to all damages occasioned by the infringement of said patent, and all gains, profits, savings, and advantages made and received by others by reason thereof, and is by law entitled to sue for and receive the same to its own use.

III. That said letters patent are of great value and the public generally acknowledge and acquiesce in the validity thereof; that the following-named brewers, and many others, have purchased licenses thereunder, namely:

Bartholomae & Leicht Brewing Company, Conrad Seipp Brewing Company, Matthew Gottfried, Bartholomae & Roesing, and Schmidt

& Glade, of Chicago, Illinois; the Phillip Best Brewing Company, Joseph Schlitz Brewing Company, and Valentin Blatz, of Milwaukee, Wisconsin; George Ehret, George Ringler & Co., Jacob Hoffman, Jacob Ruppert, and Susanna Kress, of New York City; Otto Huber, of Brooklyn, N. Y.; G. F. Burkhardt, of Boston, Massachusetts; E. W. Voigt, August Goebel & Co., Charles Endriss, Kling & Co., Martz Bros., Frederick Ditmer, and A. Michenfelder, of Detroit, Michigan; the Bartholomae Brewing Company, of Rochester, N. Y.; Albert Ziegle, of Buffalo, N. Y.; J. & A. McKechnie, of Canandaigua, N. Y.; Christian Henning, of Mendota, Illinois; Schalk Bros., and Joseph Heusler, of Newark, N. J.; Jacob Mall, of Cleveland, Ohio; J. Kuebeler & Co., of Sandusky, Ohio; Pier, Danials & Co., of Pittsburgh, Pennsylvania; Bergner & Engel, of Philadelphia, Pennsylvania; Gunther & Gehl, of Canton, Maryland; Geo. Bauenschmidt, of Baltimore, Maryland; August Fuerman, of Watertown, Wisconsin; Christian Heurich, of Washington, D. C.; Geyer Bros., of Rahway, N. J.; Mayer & Bachman, of Clifton, N. Y., and Anton Meyer, of Terre Haute, Indiana; that of said brewers above named the said Phillip Best Brewing Company, Schmidt & Glade, A. Goebel & Co., and Geyer Bros. settled and purchased licenses after suits for infringement of said patent No. 215,679 had been commenced against them, respectively, and that in the aggregate all of said brewers have paid or agreed to pay for such licenses and for apparatus for applying said invention a very large sum of money, to wit, the sum of more than one hundred thousand dollars.

4 IV. That since the granting of said letters patent No. 215,679, and at divers times and occasions between that time and the filing of this your orator's bill, Magdalena Maus, Albert C. Maus, Casper J. Maus, Frank A. Maus, and Mathias A. Maus, the defendants herein, well knowing the premises, and in infringement of said letters patent No. 215,679, and in violation of the exclusive rights of your orator thereunder, and without the license of your orator or the said Bartholomae, or any one ever interested in said patent, at Indianapolis, to wit, at the district aforesaid, have used and still continue to use the said invention patented as aforesaid, but to what extent your orator is unable to say; that your orator has notified the defendants of the said infringement and requested them to desist therefrom, but they have continued the same; and that by reason of said infringement great injury has resulted to your orator and great gains and profits have accrued to said defendants, the full amount of which is unknown to your orator, but which in equity belong to it and should be accounted for by said defendants and paid over to your orator as the avails of its exclusive rights aforesaid and profits and gains which it would have derived therefrom but for the unlawful acts of the said defendants.

V. That your orator has no adequate remedy in the premises, save in a court of equity, where matters of this nature are properly cognizable.

VI. Wherefore your orator prays—

1. That the defendants may answer the premises and may fully disclose the number of barrels of beer they have manufactured under

said patented process and the number of apparatus they have used in applying said process since the said 20th day of May, 1879.

2. That the defendants, their agents, attorneys, servants, and workmen, each and every of them, may be restrained and enjoined, as well preliminary and provisionally as perpetually, from the infringement of said patent No. 215,679.

3. That an account may be taken of the number of barrels of beer that defendants have manufactured under said patented process and of the number of apparatus they have used in applying said process since the date of said patent No. 215,679, and of the gains, profits, and advantages they have derived therefrom, and that the defendants may be decreed to pay over to your orator any and all the gains, profits, and advantages, to be duly determined, which they have made, derived, or received from the use of said patented invention in violation of your orator's rights as aforesaid; that the defendants may be decreed to pay the costs of this suit, and also all damages resulting to your orator from their use of the said patented invention, together with such increase over the actual damages suffered as is warranted by law and may seem to your honors just and proper, and that your orator may have such other and further relief in the premises as to this honorable court shall seem meet and just and agreeable to equity.

To this end may it please your honors to grant unto your orator—

1. The writ of subpœna issued out of and under the seal of this honorable court, directed to the said defendants, Magdalena Maus, Albert C. Maus, Casper J. Maus, Frank A. Maus, and Mathias A. Maus, commanding them by a certain day and under a certain penalty to be and appear in this honorable court, and then and there to answer the premises and stand to and abide by such order and decree as may be made against them.

2. The writ of injunction, as well preliminary and provisional as perpetual, issuing out of and under the seal of this honorable court, enjoining and restraining the said defendants, Magdalena Maus, Albert C. Maus, Casper J. Maus, Frank A. Maus, and Mathias A. Maus, their agents, attorneys, servants, and workmen, and each and every of them, as heretofore in that behalf prayed.

And your orator will ever pray, etc.

NEW PROCESS FERMENTATION COMPANY,
By GEORGE BARTHOLOMAE, *President.*

BANNING & BANNING,
Solicitors for Complainant.
F. W. COTZHAUSEN,
P. C. DYRENFORTH,
Of Counsel.

UNITED STATES OF AMERICA.

NORTHERN DISTRICT OF ILLINOIS, } ss:
State of Illinois, Cook County, }

George Bartholomae, president of the New Process Fermentation Company, the above named complainant, being duly sworn, upon oath says that he has read the foregoing bill of complaint and knows the contents thereof, and that the same is true of his own knowledge, except as to matters therein stated on information and belief, and as to these he believes it to be true; that he verily believes the said Leonard Meller and Edmund Hofmann to have been the original and first inventors and discoverers of the invention described and patented in said letters patent No. 215,679; that said letters patent are in all respects good and valid in law, and that said complainant is the exclusive owner thereof, as alleged in said bill.

GEORGE BARTHOLOMAE.

Subscribed and sworn to before me this 10th day of December, A. D. 1880.

[NOTARIAL SEAL.] PHILIP C. DYRENFORTH,
Notary Public.

(*Copy of Said Patent No.* 215,679.)

THE UNITED STATES OF AMERICA:

No. 215,679.

To all to whom these presents shall come:

Whereas, Leonard Meller, of Ludwigshafen-on-the-Rhine, Bavaria, and Edmund Hofmann, of Mannheim, Baden, Germany, have presented to the Commissioner of Patents a petition praying for the grant of letters patent for an alleged new and useful improvement in processes for making beer, they having assigned their right, title, and interest in said improvement to George Bartholomae, of Chicago, Illinois, a description of which invention is contained in the specification, of which a copy is hereunto annexed and made part hereof, and have complied with the various requirements of law in such cases made and provided; and

6 Whereas, upon due examination made, the said claimants are adjudged to be justly entitled to a patent under the law:

Now, therefore, these letters patent are to grant unto the said George Bartholomae, his heirs or assigns, for the term of seventeen years from the twentieth day of May, one thousand eight hundred and seventy-nine, the exclusive right to make, use, and vend the said invention throughout the United States and the Territories thereof, subject to the limitation prescribed by sec. 4887, Rev. Stat., by reason of French patent, dated November 30, 1876, and Belgium patent, dated February 28, 1877.

In testimony whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the city of Washington,

this twentieth day of May, in the year of our Lord one thousand eight hundred and seventy-nine, and of the Independence of the United States of America the one hundred and third.

[L. S.] A. BELL,
Acting Secretary of the Interior.

Countersigned:
W. H. DOOLITTLE,
Acting Commissioner of Patents.

Specification forming part of Letters Patent No. 215,679, dated May 20, 1879; application filed February 12, 1879; patented in France November 30, 1876, and in Belgium February 28, 1877.

To all whom it may concern:

Be it known that we, Leonard Meller, of Ludwigshafen-on-the-Rhine, in the State of Bavaria, and Edmund Hofmann, [of] Mannheim, in the State of Baden, Germany, have invented certain new and useful improvements in the art of making beer, and we hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which the figure represents an end view of our apparatus with the water-column in section.

Heretofore, in brewing beer, after cooking and cooling, the beer has been put into open vessels to ferment. The fermentation lasts, say, fifteen days, and then the beer is drawn off from the yeast into large casks nearly closed, where it remains from one to six months to settle, and among the sediment there will still remain some yeast. The beer is then pumped into shavings casks and is mixed with young beer (kraeusen), which starts a mild fermentation, lasting from ten to fifteen days, until the generation of the gas is reduced to a minimum. During this fermentation the beer effervesces through means of the carbonic acid gas rising, and the lighter particles of yeast and solid matter are thrown to the top, forming a foam, which, during the ebullition, runs over the edges of the opening in the cask, and carrying along a small portion (more or less) of the beer, which is wasted, and this waste has to be replaced by refilling with new beer daily. This wastage we estimate, from practical experience in the manufacture, to be about one barrel in every forty, more or less. This waste beer, running down around the casks and on the floor of the cellars, sours and produces a mildew, which impregnates the air with foul vapors highly injurious to the workmen, and, permeating the beer in the casks, alters its flavor and, in instances where the mildew penetrates the wood of the casks, spoils the beer entirely. This fouling of the barrels requires that they should be washed outside, from time to time, and the water used in this washing always raises the temperature of the cellar, and wastes the ice which is therein packed to keep the temperature about 41° Fahrenheit. After the beer has been in the shavings cask from ten to fifteen days the gelatine or other clarifying medium is introduced, and at the end of a couple of days the beer is entirely clear. The shavings cask is then bunged up

7

tightly for from three to five days to confine the last portions of the rising carbonic acid gas. This charges the beer with carbonic acid gas (CO_2), so as to make it merchantable, and it must be drawn off at once into kegs and used, otherwise the pressure on the shavings cask may burst it.

In selecting the time for drawing off the beer from the shavings casks into the kegs to send it to market the beer should never be under a pressure of over seven pounds to the square inch, otherwise the keg fills with foam in the drawing off, and the bubbles subsiding leaves an air-space over the liquid beer, which absorbs a portion of the carbonic acid gas and soon leaves the beer in the keg flat. As the art is now practiced, arriving at the proper degree of pressure when to put the beer in kegs is merely a matter of judgment or guess by the foreman, and no two shavings casks will be drawn off at precisely the same pressure, and the effervescing qualities of the beer will vary considerable, much to the detriment of sales by the brewer. If the beer is not put in market at once at this stage the bungs have to be removed from the casks and the gas allowed to escape. Then the escaping gas stirs up the yeast and impurities that have settled to the bottom, and the beer has to go again through the entire shavings-cask step in the process.

Under the processes now in use it requires about twenty days to put beer on the market after it is pumped into the shavings casks. This delay requires brewers to keep a large amount of capital invested during the time in unfinished beer, and it is highly important to decrease this time of preparation.

The essential features of our invention have been patented in foreign countries as follows: France, to Leo. Meller & Co., filed September 28, 1876, allowed and countersigned, Paris, November 30, 1876, No. 114,737; Belgium, to Leo. Meller & Co., filed February 14, 1877, allowed and countersigned, Bruxelles, February 28, 1877, No. 41517.

The object of our invention is to overcome the difficulties above named, and also to produce in a shorter time a better quality of beer containing more sugar and less alcohol.

Our invention consists in treating the beer when in the shavings-cask step of the process in one or more closed casks under automatically controllable carbonic acid gas pressure, generated either by the mild fermentation of the beer or artifically. This equalizes the pressure in such cask or series of casks, and the effervescing quality of the beer in all the casks when two or more are connected together is uniform.

The cask or casks being closed, none of the beer wastes by running over and the foul smells and washing of the casks and cellars are avoided. The escaping carbonic acid gas is conducted from the relief-valve to the open air, and does not settle in the brewing cellars to endanger life.

Our invention consists, further, in similarly treating the beer when in the "kraeusen" stage, or subsequently thereto, or both, or when [in] the settling casks ("ruh-beer"), this being the second fermenting stage—that is to say, our invention consists in so treating

the beer at any time or times previous to racking off and bunging or bottling.

In order that those skilled in the art may make and use our invention, we will proceed to describe the manner in which we have carried it out.

8 In the drawings A A are shavings casks, having faucets *a a*, provided with valves *i i*, inserted tightly in their bungs. These faucets are connected to taps N on the main pipe *a'* by means of flexible sections *k*, provided with couplings. The taps or connections have valves *i' i'*. Pipe *a'* bends upward and passes above the level of a water column, C, and then, passing downward, enters the base of the column at *x*, where it is provided with a cock, *b'*. The water column or vessel C has a faucet, *d*, to draw off water when desired to decrease the pressure. A depending branch-pipe, *e*, and cock, e^1, serve to discharge any condensed moisture from pipe *a'*, and a pressure-gage, e^2, serves to indicate the pressure.

By means of a gas-generator located at *h* and connected to pipe *a'* by means of pipe *f*, having cock *g*, we are enabled to test the joints of the apparatus and drive all atmospheric air from the pipes when the operation begins.

At the top of the water column is a conical cap terminating in a pipe, E, which is projected out of the building and leads all the gas into the open air. Located within this cap is a conical diaphragm, C', centrally located, so that, should the escape of the gas become so rapid as to lift the body of water upward, the water will be arrested by the diaphragm, while the gas escapes around its edges.

It is evident that the pressure in all the shavings casks connected with pipe *a'* will be equal, and will be kept so indefinitely by means of the water column, and, as far as the enlivening of the beer is concerned, it is always ready for market, be it ten days or four months, whereas in processes now practiced beer has to be bunged at a particular time for a particular day's market.

Our process enables the brewer to keep on hand merchantable beer, which can be shipped instantly, or, if trade decreases, it enables him to keep his stock on hand without deterioration till the demand is made for it.

All that has been said above in relation to a series of casks applies, of course, equally to treatment in a single cask.

It is obvious that means other than a water column may be adopted for equalizing the pressure of the gas without departing from the spirit of our invention—as, for example, safety-valves and the like—and the apparatus is susceptible of many other variations without affecting the process itself, which constitutes the essence of our invention.

By using our process we are enabled to clarify the beer and clear it of impurities in eight days or less, whereas in the ordinary process it takes from twelve to twenty days. This immense gain in time we ascribe to the following action: The air being forced out of the pipes, the carbonic acid fills them and the space in the casks above the beer. Then the gas slowly accumulates in the space above the beer until the pressure above is such as to overcome the

density of the beer and re-enter it, so as to charge it up to the pressure for which the column is set. This creates, in a manner, an equilibrium between the rising bubbles and the pressure above, during which gravity can act rapidly on the yeast and impurities in the beer and carry them down among the shavings at the bottom of the cask, where they remain.

We introduce the clarifying gelatine into the shavings casks after the beer is introduced, and before connecting with pipe *a'*, and actual practice has demonstrated to us that to clarify the beer by our process requires only about one-half of the gelatine heretofore used.

This saving, together with the saving of the waste beer here-
9 tofore mentioned (one or more barrels in every forty) and the saving of labor, will greatly cheapen the production of beer.

When we desire to make beer for bottling we attach our apparatus to the settling casks filled with beer, and no young beer (kraeusen) is added, but a little gelatine is added and the beer allowed to remain for from fourteen to twenty days, until it becomes "lively" (saturated with CO_2), and it is then bottled.

We find that bottled beer prepared this way is healthier, and will last in good condition two or three months, whereas the beer bottled in the usual manner with kraeusen beer lasts only for eight or ten days if pure and not steamed after bottling, the latter spoiling the aroma and flavor.

Having thus described our invention, what we claim as new, and desire to secure by letters patent, is—

1. The process of preparing beer for the market, which consists in holding it under controllable pressure of carbonic acid gas when in the "kraeusen" stage, substantially as set forth.

2. The process of treating beer when in the kraeusen stage, which consists in holding it in a vessel under automatically controllable pressure of carbonic acid gas, substantially as described.

3. The process of preparing and preserving beer for the market, which consists in holding it under controllable pressure of carbonic acid gas from the beginning of the kraeusen stage until such time as it is transferred to kegs and bunged, substantially as described.

4. The method herein described of preserving beer in a marketable condition after it has passed the kraeusen stage, which consists in holding it under pressure of carbonic acid gas, said pressure being automatically regulated by a counteracting hydrostatic pressure, substantially as described.

5. The process of treating beer when in the second fermenting stage ("ruh-beer"), which consists in holding it under automatically controllable pressure of carbonic acid gas, substantially as described.

6. The process of treating beer in the course of its manufacture, which consists in holding it in closed connected vessels under automatically controlled pressure of carbonic acid gas, substantially as described.

7. The process of clarifying and settling beer in a series of shavings casks, and equalizing the rate of fermentation in all of them, whereby the beer is more rapidly and thoroughly clarified, and will

be ready for racking off in all the casks at the same time, and can be kept so, which consists in holding the beer in closed connected shavings casks under automatically controlled low pressure of carbonic acid gas, substantially as described.

8. Casks A A, provided with cocks *a a*, flexible sections *k*, and taps N N, in combination with main pipe *a'*, water column C, and pressure-gauge e^2, all constructed, arranged, and operated as and for the purposes set forth.

LEONARD MELLER.
EDMUND HOFMANN.

In presence of—
PH. BARTHOLAMAE.
P. BERRETOO.

(Here follows diagram marked p. 10.)

10 And afterwards, to wit, at the November term, 1880, of said court, on the 18th day of January, 1881, before the Honorable Walter Q. Gresham, one of the judges of said court, the following further proceedings in the above-entitled cause were had, to wit:

Come now the defendants, by Harrington and Howe, their solicitors, and enter their appearance herein.

And afterwards, to wit, at the November term of said court, on the 12th day of April, 1881, before the Honorable Walter Q. Gresham, judge as aforesaid of said court, the following further proceed-
11 ings in the above-entitled cause were had, to wit:

Come now the defendants, Magdalena Maus, Albert C. Maus, Frank A. Maus, and Mathias A. Maus, by Messrs. Harrington and Howe and Messrs. Duncan, Smith and Duncan, their solicitors, and file their answer herein in the words following, to wit:

The joint and several answer of Magdalena Maus, Albert C. Maus, Frank A. Maus, and Mathias A. Maus, defendants, to the bill of complaint of the New Process Fermentation Company, plaintiff.

These defendants, respectively, now and at all times hereafter, saving to themselves all and all manner of benefit or advantage of exceptions or otherwise that can or may be had or taken to the many errors, uncertainties, and imperfections in the said bill contained, for answer [thereto], or to so much thereof as these defendants are advised it is material or necessary for them to make answer to, severally answering, say—

That said assignors of said complainant, as set out in the bill of complaint, are not the original and first inventors or discoverers of any material part of the subject-matter of the patent sued on, and are not the original and first inventors or discoverers of the process of preparing beer for the market by holding it under con-
12 trollable pressure of carbonic acid gas when in the kraeusen stage, nor of the process of treating beer when in the kraeusen stage by holding it in a vessel under pressure of carbonic acid gas,

L. MELLER & E. HOFMANN.

Process for Making Beer.

No. 215,679. Patented May 20, 1879.

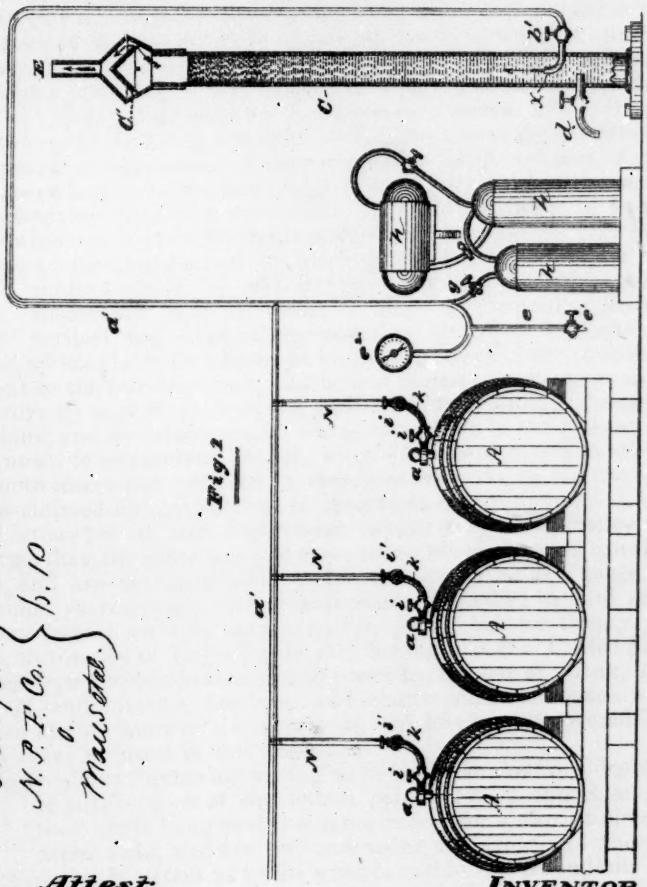
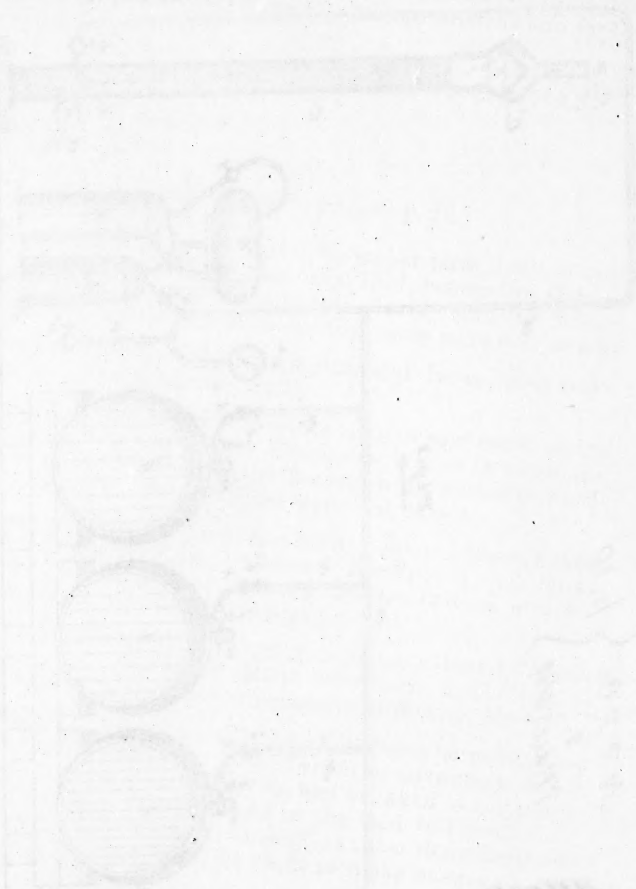


Fig. 2

No. 298. N.Y.F. Co. 5.10 a. Maussätze.

Attest:
W. L. Baker
H. Fastang

INVENTOR
Leonard Meller
Edmund Hofmann
By Fred. W. Wolf.
Attorney



nor of the process of preparing and preserving beer for the market by holding it under controllable pressure of carbonic acid gas, nor of the method of preserving beer in a marketable condition after it has passed the kraeusen stage by holding it under pressure of carbonic acid gas by automatic pressure, nor of the process of treating beer when in the second fermenting stage, nor of the process of treating beer in the course of its manufacture by holding it in closed vessels under pressure of carbonic acid gas automatically controlled; that for a long period, viz., more than a year, before the application for the letters patent sued on the respondent herein, Albert C. Maus, at the city of Nashville and State of Tennessee, was the inventor and discoverer of the process of preparing beer for the market, of treating beer when in the kraeusen stage, of preserving beer for the market, of preserving beer in a marketable stage or condition, of treating beer when in the second fermenting stage, of treating beer in the course of its manufacture by holding and keeping it under automatic pressure of carbonic acid gas; which said process so
13 discovered by said Albert C. Maus is hereinafter fully described, and is the process now used by respondents and none other, which plaintiffs aver to be an infringement of the process and patent in the bill described, which said matters respondents expect to prove by said Maus, who is a resident of the city of Indianapolis, Indiana, and by other persons whose names are at the present time unknown to respondents, which, when discovered, respondents pray leave to insert and set forth in their answer. As to the combinations claimed by complainant in specifications numbered 7 and 8 of said letters patent, the respondents say, as they verily believe and charge, that the same are not new, either severally or in combination, and are not patentable under the law; that the pipes, connections, valves, cocks, and combinations described in said subdivisions have been well known and in public use for twenty years past, in the city of Indianapolis and throughout the United States, which facts respondents expect to prove by Erastus O. Frink, of the city of Indianapolis, Indiana, and many other witnesses, whose names are not known to respondents, which, when discovered, they pray leave to insert in this answer.

Respondents further answering, as to said combinations described in subdivisions of the letters patent Nos. 7 and 8, say that
14 they never have used the same except for a short time as an experiment, and are not now using the same, and therefore if the plaintiffs' patent as to the same is valid these defendants have never infringed upon the same, as they verily believe.

Respondents further answering said bill, except that part thereof which claims a patent on the process therein described, say that both before and since the commencement of this action said plaintiffs represented and informed said respondents that all they claimed to be entitled to hold by the letters patent sued on was the process of holding and controlling beer automatically under carbonic acid gas; that they made no claim to any other part of said letters patent and no claim to the water column, bungs, connections, and combinations, and that respondents might use every thing referred to

in said letters patent except the process, and respondents say they believed said statements and representations and relied thereon, and that plaintiff should be estopped from making any claim now against respondents except what she may *be* establish to said process.

Respondents further say that said process and said alleged discovery and invention claimed by complainant in her letters patent sued on, as respondents are informed and believe, and therefore state, had been described in a certain publication prior to complainant's supposed discovery thereof in a book known as "School of Beer Brewing," book one, on page 358, published and sold to the public in the city of Cincinnati, State of Ohio, in the years 1863 and 1864, long before said complainant's supposed discovery.

Respondents further say that, as they are informed and believe, and therefore state, the inventions and process claimed by plaintiff in her letters patent had been discovered and published and described and patented prior to the supposed invention and discovery claimed in the bill, viz., by letters patent No. 90349, issued to —— Dretickson May 25th, 1869, and also by letters patent, issued to —— Eickineger Sept. 22d, 1868, No. 82394, and also by letters patent issued to Thos. R. Hicks April 9, 1867, and also by letters patent issued to Henry Schtandeman June 11, 1878, and also by letters patent issued to Otto Zwitusch & E. Hertman—application filed Dec. 11, 1878—

All of which matters respondents expect to prove by certified copies of said letters patent and specifications, and by Erastus O. Frink, of the city of Indianapolis, Ind., and by other witnesses, whose names are now unknown to respondents, which, when discovered, they pray leave to insert in this answer.

Respondents further say that the apparatus and process used by defendants is as follows, viz: A bung, through which a hole is bored from top to bottom, is inserted in the bung-hole of a cask; a small rubber hose about five feet long is attached with one end, by means of a brass top, tightly to the hole at the top of said bung. To the other end of this piece of hose a tin vessel is attached to receive the foam or beer that may be forced through this piece of hose with the escaping carbonic acid gas. This tin vessel is air-tight and large enough to hold about two gallons, and is provided at the bottom with a small tap for drawing off the beer that may accumulate in it. Now, where the short piece of hose enters the tin vessel another piece of hose enters also, and leads to and is attached to a stand-pipe about three inches above its base. This stand-pipe is four inches in diameter, about fifteen feet high, and open at the top. It contains as much water as is requisite to afford the desired pressure under which we aim to prepare our beer.

The pressure in the cask can be increased or diminished by increasing or lessening the amount of water in said stand-pipe, the whole forming a combination by which a uniform pressure of carbonic acid gas is maintained in the cask, which we use after the beer has gone into the shaving casks & nowhere else. If the beer in the cask generates more gas than is required to

establish the desired pressure it will escape through the rubber hose and the water in the stand-pipe to which the hose is attached.

And for answer specially to the interrogatories propounded respondents, answering, say—

1st. That they have not manufactured any beer whatever by any process other than that last above described as being used by them, and by such process, as near as respondents are able to tell, they have manufactured — barrels of beer since May 20th, 1879.

All which matters and things these defendants are ready and willing to aver, maintain, and prove as this honorable court shall direct, and humbly pray to be hence dismissed with their reasonable costs and charges in this behalf most wrongfully sustained.

SMITH AND DUNCAN,
HARRINGTON & HOWE,
Respondents' Solicitors.

STATE OF INDIANA, *Marion County:*

Frank A. Maus, being duly sworn, deposes and says that
18 he — book-keeper for the respondents, who are engaged in the manufacture of beer, and that he has heard the foregoing answer read over, and he says that the matters therein stated as facts are true and the matters therein stated on information and belief are true, as he verily believes.

FRANK A. MAUS.

Subscribed & sworn to before me, a notary public in & for said county, this 11th day of April, A. D. 1881.

[SEAL.] GEO. F. KUHN, *N. P.*

And at the same time comes the defendant, Casper A. Maus, by his solicitors, and, upon his motion, the time for filing his answer herein is hereby extended to the first Monday of May next.

And afterwards, to wit, at the May term of said court, on the 10th day of June, 1881, before the Honorable Walter Q. Gresham, judge as aforesaid of said court, the following further proceedings in the above-entitled cause were had, to wit:

On motion of the defendants' counsel, time for filing the answer herein is hereby extended to the first Monday in August next.

And afterwards, to wit, at the May term of said court, on the 30th day of July, 1881, before the Honorable Walter Q. Gresham,
19 judge as aforesaid of said court, the following further proceedings in the above-entitled cause were had, to wit:

Come now the defendants, by counsel, and file their answer herein in the words following, to wit:

20 The answer of Magdalena Maus, Albert C. Maus, Frank A. Maus, and Mathias A. Maus, defendants, to the bill of complaint of the New Process Fermentation Company, complainant.

These defendants, now and at all times hereafter, saving and re-

serving unto themselves all benefit and advantage of exception which can or may be had or taken to the many errors, uncertainties, and other imperfections in the said complainant's bill of complaint contained, for answer thereto, and unto so much and such parts thereof as these defendants are advised is or are material or necessary for them to make answer unto, *these defendants for* answering, saith :

That these defendants do not know and are not informed, save by said bill of complaint, whether said Leonard Meller and Edmund Hofmann received letters patent from the French and Belgian governments, respectively, as and for an invention of a new and useful apparatus and improvement in processes for making beer, and they leave the complainant to make such proof thereof as she shall be advised is material.

And for answer to so much of said bill of complaint as alleges that said Meller and Hofmann explained said apparatus and process to one George Bartholomae, of Chicago, Illinois, for the purpose and intention of introducing the same into this country and obtaining a patent therefor from the United States Government, and that, to accomplish that end, they constituted and appointed said Bartholomae their lawful agent and attorney ; these defendants further severally say that they or any or either of them, to the knowledge or belief of the others or either of them, do not know and have never been informed save by the said complainant's bill, and they leave the complainant to make such proof thereof as she may be advised is material.

And for answer to so much of said bill of complaint as alleges that said Bartholomae, on account of his personal ignorance and inexperience, by inadvertence and mistake, caused the application to be made for such patent in his own name and procured such patent to be issued to him personally, these defendants deny the same ; but, on the contrary, they say that, as they are informed and verily believe, said George Bartholomae, at the time of his making application for and procuring the issuance to him of said letters patent, was well advised in the premises and was assisted by able counsel versed in the law, and said Bartholomae acted advisedly in all that he did in the premises.

And these defendants have been informed, and admit it to be true, that upon said application letters patent of the United
21 States were granted and issued to said George Bartholomae, on the 2d day of April, 1878, for an alleged improvement in the process of clarifying and settling beer in a series of shavings casks, and for a certain apparatus for conducting such process ; and these defendants further severally say that they, or any or either of them, to the knowledge or belief of the others or either of them, do not know and have never been informed, save by the said complainant's bill of complaint, whether or not said George Bartholomae did properly make application for said patent, and did comply with all the requirements of law, and did have the said patent issued to him in due form of law, and leaves the complainant to make such proof thereof as she shall be advised is material.

And, for answer to so much of said bill of complaint as alleges that said Meller and Hófmann afterward discovered that said Bartholomae had, by an alleged mistake, procured said letters patent to be issued to him in his own name, and that thereupon they made application to secure letters patent of the United States to be issued to themselves for said apparatus and process, these defendants say that they are informed, and admit it to be true, that said Meller and Hofmann did cause an application to be filed in the Patent Office, in the city of Washington, for letters patent of the United States; but these defendants say that the claim of said Meller and Hofmann in their said application was very much expanded over and above the claim of said Bartholomae; that while said Bartholomae, in his said application, only claimed the process of clarifying and settling beer in the latter stage of its manufacture, in a series of shavings casks, so as to produce a uniformity and an automatic regulation of pressure in the whole series of casks, the said Meller and Hofmann claimed in their said application the entire process of treating beer under automatically controllable pressure of carbonic acid gas, through every period of its manufacture, and whether in a single cask or a series of casks.

And these defendants further admit that upon said application so made by said Meller and Hofmann letters patent were issued by direction and upon the formal assignment of said Meller and Hofmann to said George Bartholomae; but whether said assignment was made in good faith and upon valid consideration, or whether the entire proceeding of Meller and Hofmann's making their application and the subsequent proceedings, ending in the issuing of letters patent to said Bartholomae upon said alleged assignment of said Meller and Hofmann, was not a plan contrived by said Bartholomae to procure letters patent covering said enlarged and expanded claim, these defendants severally say that they, or any or either of them, to the knowledge or belief of the others, or either of them, have never been informed, save by the complainant's bill of complaint, and they leave the complainant to make such proof thereof as she may be advised is material.

And whether said letters patent of the United States last above named as being issued to said George Bartholomae were issued to him after he or his said assignors had fully complied with the requirements of the law these defendants further severally say that they, or any or either of them, to the knowledge or belief of the others or either of them, do not know and have never been informed, save by the bill of complaint herein, and they leave the complainant to make such proof thereof as she may be advised is material.

22 And these defendants, further answering, say that they or any or either of them, to the knowledge or belief of the others or either of them, do not know and are not informed, save by the complainant's bill of complaint, whether or not said George Bartholomae sold and assigned his right, title, and interest in said patent and alleged invention secured by said letters patent, or any interest therein, to the said New Process Fermentation Company,

complainant, and he leaves her to make such proof thereof as she may be advised is material.

And these defendants, on information and belief, deny that by virtue of any such patent and assignment mentioned in said bill of complaint said complainant became or ever was possessed of or vested with the exclusive right to make, use, or sell in the United States the alleged invention patented by said letters patent.

And these defendants, further answering, deny that the said invention so patented by said letters patent are of great value or of any value, or that the public generally have acquiesced in or have acknowledged the complainant's exclusive right to the same or any portion thereof.

And these defendants, further answering upon information and belief, specifically deny that the said Philip Best Brewing Company, of Milwaukee, and the said Schmidt & Glade, of Chicago, and the said Geyer Bros., of Rahway, New Jersey, did settle and purchase licenses after suits for infringement of said patent had been brought; but that, on the contrary, the said Philip Best Brewing Company and the said Schmidt & Glade, of Chicago, having been sued by the said George Bartholomae, who at that time claimed to be the owner of said invention and said letters patent, under an assignment from said Meller and Hofmann, did receive from said Bartholomae, upon his own solicitation and request, and without any charge or expense whatever to said Philip Best Brewing Company, or to said Schmidt & Glade, licenses to use the same, and at the request and expense of said Bartholomae, and without any charge to either said Philip Best Brewing Company or to said Schmidt & Glade, said Bartholomae caused an apparatus to be placed in each of their breweries; and the said Bartholomae, after having obtained from the said Geyer Bros. an assignment of a certain application filed with the Commissioner of Patents for an apparatus involving substantially the same invention, and covering entirely the alleged process claimed by said Meller and Hofmann, did pay unto the said Geyer Bros., or to Philip Geyer, one of the Geyer Bros., a sum of money, not less than one thousand dollars, for the said assignment unto them of all the rights that might accrue to him, said Philip Geyer, under said application for a patent; that the invention described in the application of the said Geyer had been previously publicly used by said Geyer, and had been abandoned to the public by said Geyer five years previous to the date of said letters patent No. 215,679.

That the said application of Geyer is still now pending, and the said application, which involves an interference between the patent of the said Meller and Hofmann and the application of the said Philip Geyer, is now held pending by the assignees thereof for the purpose of avoiding an interference.

And these defendants further show the court that they are informed and believe that the said suits brought by the said George Bartholomae against the said Philip Best Brewing Company and Schmidt & Glade were discontinued without cost to said defendants and at the expense of said Bartholomae.

23 And these defendants, further answering, say that they are informed and believe that the said Bartholomae and the said Philip Best Brewing Company and Schmidt & Glade, with their respective counsel, took a large mass of testimony, in the city of New York, in the above-mentioned suits, and that overwhelming proof was then and there adduced on the part of the defendants that the alleged process and apparatus claimed under letters patent 215,679 were old and unpatentable, and that thereupon the said Bartholomae discontinued the suits against the Philip Best Brewing Company and Schmidt & Glade.

That in said causes said defendants were represented by Otto Zweitusch and F. W. Cotzhausen as counsel; that said Zweitusch was the owner jointly with the said Philip Best Brewing Company of a certain patented apparatus, which was then being used by said Philip Best Brewing Company, and for the use of which said suit was brought as and for an alleged infringement; that thereupon said Zweitusch and said Bartholomae consolidated their interests, and said causes were dismissed without said evidence ever being submitted to the court, and the same is not now on the files of the court; and the said Zweitusch is now secretary of the complainant corporation, and said Cotzhausen is now retained as counsel by the complainant herein.

And these defendants, further answering, say that said Meller and Hofmann, the complainant's assignors, as set out in the bill of complaint, are not the original and first inventors or discoverers of the process of preparing beer for the market by holding it under automatically controllable carbonic acid gas when in the kraeusen stage, nor of the process of treating beer when in the kraeusen stage by holding it in a vessel under pressure of carbonic acid gas, nor of the process of preparing and preserving beer for the market by holding it under automatically controllable pressure of carbonic acid gas, nor of the method of preserving beer in a marketable condition after it has passed the kraeusen stage by holding it under automatically controllable pressure of carbonic acid gas, nor of the process of treating beer when in the second fermenting stage, nor of the process of treating beer in the course of its manufacture by holding it in closed vessels under pressure of carbonic acid gas automatically controlled; that for a long period, viz., for more than one year before the application for the letters patent sued on, Albert C. Maus, one of the defendants herein, at the city of Nashville, in the State of Tennessee, was the inventor and discoverer of a certain apparatus calculated and intended to be used in the process of preparing beer for the market, of treating beer when in the kraeusen stage, of preserving beer for the market, of preserving beer in the marketable stage or condition, of treating beer when in the second fermenting stage, of treating beer when in the course of manufacture by holding and keeping it under automatically controllable pressure of carbonic acid gas, and which apparatus was actually used by him in the clarifying and settling of beer in the shavings casks, which process so discovered and used by said Albert C. Maus is hereinafter more fully described, and is the process now used by

the defendants and none other, which the complainant avers to be an infringement of the process and patent in the bill of complaint described, which said matters these defendants expect to prove by said Albert C. Maus, who is a resident of the city of Indianapolis, in the State of Indiana, and by others whose names are at present unknown to these defendants, which, when discovered, they pray leave to insert and set forth in their answer.

24 As to the combinations claimed by complainant in specifications numbered 7 and 8 in said application for said letters patent, these defendants say, as they verily believe and charge, the same are not new, either severally or in combination, and are not patentable under the law; that the pipes, connections, valves, cocks, and combinations described in said subdivisions have been well known and in public use for twenty years past in the city of Indianapolis and throughout the United States, which facts respondents expect to prove by Erastus O. Frink, of the city of Indianapolis, State of Indiana, and many other witnesses, whose names are not now known to these defendants, which, when they discover, they pray leave to insert in this their answer.

And these defendants, further answering, as to said combinations and apparatus described in said subdivisions Nos. 7 and 8 of the claim in said application for said letters patent, say that they have never used the same, except for a short time as an experiment, and are not now using the same, and therefore, if complainant's patent as to the same is valid, these defendants have never infringed upon the same, as they verily believe.

These defendants, further answering said bill of complaint, except that part thereof which claims a patent in the process therein described, say that both before and since the commencement of this action said complainant represented to and informed these defendants that all she claimed to be entitled to hold by the said letters patent sued upon was the process of holding and controlling beer automatically under the pressure of carbonic acid gas, and that they made no claim by reason of any other part of said letters patent, and that they made no claim to the water column, bungs, connections, and combinations, and that respondents might use everything referred to in said letters patent except the process; and these defendants say they believed said representations and statements and relied thereon, and that said complainant should be estopped from making any claim against said respondents except what she may establish as to said process.

And these defendants, further answering, say that they are informed, and believe it to be true, that for the purpose of deceiving the public, the description and specification of the said invention filed by the said Meller and Hofmann were purposely made to contain less than the whole truth relative to the state of the art of said invention, in this, that the said inventors claimed that previous to their invention it required twenty days to prepare beer for the market, after having been put in the shavings casks, when it required in truth but from four to eight days instead of twenty days, as alleged by said Meller and Hofmann.

And these defendants show to the court that in the present state of the art, and without the application of the apparatus mentioned and described in said letters patent, beer can be produced in entirety in less than twenty days; and in many other respects these defendants allege that the said inventors have attempted to deceive the public by the statements contained in the said specification.

And these defendants, further answering, say that they are informed, and believe it to be true, that the description of the alleged invention, as set forth in the specification annexed to the said letters patent No. 215,679, is incomplete and ambiguous, and the said specification does not show the method of making and using the said alleged patented invention in such full, clear, and exact terms as to enable any person skilled in the art or science to which it appertains to make and use the same.

25 And these defendants, further answering, say that they are informed and believe it to be true that the said invention and discovery was in fact invented and discovered by, and the same principle had been previously combined and used by another—that is to say, by one Paul Muehlhauser, at the brewery of Robert Portner, Esq., in Alexandria, Virginia; that the said Muehlhauser had used substantially the same apparatus and process some seven years previous to the date of said patent No. 215,679, and prior to the time of the alleged invention and discovery by said Meller and Hofmann; that the said Muehlhauser is now a resident of the city of Baltimore, State of Maryland, and that the same principle had been known and used by one Philip Geyer, of Rahway, New Jersey, five years previous to the date of said letters patent No. 215,679, while he was foreman for Philip and William Ebling, at Morrisiana, in the State of New York; and, further, that the same principle and invention has been known and has been in continuous use by De Lavergne & Burr, brewers, of the city of New York, in the State of New York, who have used the said invention for more than four years last past; and, further, the same principle and invention had been known and used by George Ehret, brewer, in the city of New York and State of New York, for ten years last past; and, further, that the same principle and invention had been used by Henry Gunther at the brewery of John Kress, in the city of New York, in the State of New York, for ten years last past; and, further, that the same invention and principle had been known and used by Schwaner & Amend continuously for ten years last past; and, further, that the same principle and invention had been known and used by one John C. Schaeffer, also of the city of New York, State of New York, who had invented and used, and sold to others to be used, an apparatus designed and intended to be used for the purpose of automatically controlling the pressure of gas generated by beer fermenting while in the shavings casks; and, further, the same invention and principle had been known and used by Mayer & Bachman, of Staten Island, in the State of New York, for seven years last past; and, further, that the same principle and invention had been known and used for many years by one Keeley, a brewer, of Chicago, in the State of Illinois; and, further, that the same principle and invention had been known and

used by the public generally prior to the granting of letters patent No. 215,679 to the said Meller and Hofmann.

And these defendants, further answering, say that they are informed and believe it to be true that the said invention and discovery, and the same principle and combination or the substantial and material parts thereof, patented in and by the letters patent mentioned in the bill of complaint aforesaid was patented on July 16th, 1841, by letters patent granted and issued to one Charles D. Wolpers, who at [that] time resided in the city of Cincinnati, in the State of Ohio, and prior to the supposed invention and discovery thereof by the said Meller and Hofmann; and, further, that the pretended invention and discovery, and the same principle and combination or substantial parts thereof, was patented by one George Wallace by letters patent No. 62581, bearing the date of March 5th, 1867; the said George Wallace now resides in the city of Indianapolis, in the State of Indiana; and, further, that the pretended invention and discovery, and the same principle and combination or substantial and material parts thereof, were patented in and by letters patent granted to one William Gilham by letters patent bearing date the 13th day of June, 1871, said letters
26 patent being numbered 115,950, who at that time resided in the city of Richmond, State of Virginia, and prior to the supposed invention and discovery thereof by said Meller & Hofmann; and, further, the same invention and discovery, and the same principle or substantial parts thereof, was patented and described in letters patent No. 63636, issued on the 9th day of April, 1867, to one Thomas R. Hicks, who then resided at New Britain, in the State of Connecticut, and that the specification of the said Hicks fully and clearly describes the process claimed by the said Meller and Hofmann, and prior to the supposed invention and discovery thereof by said Meller and Hofmann that the said patent of Thomas R. Hicks was assigned to Otto Zweitusch, and that he, as assignee of the said Hicks, did apply for a reissue of said patent, intending to obtain the process claimed and described by the said Meller and Hofmann, but the same was denied by the Commissioner of Patents.

And these defendants, further answering, allege that the said invention and discovery, and the same principle and combination or substantial and material parts thereof, described and patented by letters patent No. 215,679 was patented by R. D'Heureuse, of the city of New York, in the State of New York, on the 3d day of August, 1869, No. 93182; and also by letters patent No. 112,226, dated February 28, 1871, issued to the same person, and prior to the supposed invention of said Meller and Hofmann.

And these defendants further show that the said invention and discovery, and the same principle and combination or substantial and material parts thereof, described in and patented by said letters patent No. 215,679 was patented by letters patent of the United States as follows: Letters No. 294,687, dated June 11, 1878, issued to Henry Schlaudemann; letters No. 205,572, dated July 2, 1878, issued to John M. Pfaudler; letters No. 208,771, dated October 8, 1878, issued

to Theodore F. Straub, and letters patent No. 215,596, dated the 20th day of May, 1879, issued to Frank Fehr, and also divers others.

And these defendants, further answering, say that they are informed and believe it to be true that the said Meller and Hofmann were not the original and first or joint inventors of the invention by them described in their application for said letters patent No. 215,679, and they leave the complainant to make such proof thereof as she shall be advised is material.

And these defendants, further answering, say that they are informed and believe it to be true that the said invention and discovery, and the same principle and combination or substantial and material parts thereof, patented in and by the letters patent mentioned in the bill of complaint aforesaid was mentioned and described in a printed publication—that is to say, in the Brewers' Gazette, edited by John Flintoff and published in the city of New York—in the month of February, 1875, a publication published and issued and publicly circulated and distributed prior to the supposed invention and discovery by said Meller and Hofmann of the said alleged invention, discovery, principle, and combination, the said description being on page 38 in said publication.

And these defendants, further answering, say that they are informed and believe it to be true that the said invention and discovery, and the same principle and combination or substantial and material parts thereof, patented in and by said letters patent No. 215,679, mentioned in the bill of complaint, was mentioned and described in a printed publication—that is to say, in a book
27 entitled a "Hand Book on the Art of Brewing," by one Ladislaus Von Wagner, published at Weilmar, Germany, in 1877, on page 728 of volume 2.

And these defendants, further answering, say that they are informed and believe it to be true that the said invention and discovery, and the same principle and combination or substantial parts thereof, patented in and by said letters patent No. 215,679, mentioned in the bill of complaint aforesaid, was mentioned and described in a printed publication—that is to say, in a book entitled "School of Beer Brewing," published in the city of Leipzig, in Germany, and purchased by Casper Maus, Sr., at the city of Cincinnati, in the State of Ohio, in the years A. D. 1863 or 1864, a publication published, issued, and publicly circulated and distributed prior to the supposed invention and discovery by said Meller and Hofmann of the said alleged invention, discovery, principle, and combination, the said description being on page 358 of said publication.

And these defendants, further answering, say that the apparatus and process used by them is as follows: A bung through which a hole is bored from top to bottom is inserted in the bung-hole of a cask; a small rubber hose about five feet long is attached at one end to the hole at the top of said bung by means of a brass top. At the other end of the hose a tin vessel is attached thereto to receive the foam or beer that may be forced through this hose by the escaping carbonic acid gas generated by the beer in the cask; this tin vessel is air-tight, is made to hold about two gallons, and is provided at

the bottom with a small tap for drawing off the beer that may accumulate in it. Near where this first hose is attached to the tin vessel another hose is attached to said tin vessel and leads to and is attached to a stand-pipe about three inches above its base; this stand-pipe is four inches in diameter, about fifteen feet high, and is open at the top. It is supplied with water to the height necessary to afford the desired pressure under which said defendants are to prepare their beer. The pressure in the casks can be increased or diminished by increasing or lessening the height of the water in the stand, the whole forming a combination by which a uniform and automatically controllable pressure of carbonic acid gas is maintained in the cask. If the beer generates more gas than is required to establish the desired pressure, it will escape through the rubber hose and the water in the stand-pipe to which it is attached. This apparatus the defendant uses only after the beer has gone into the shavings cask, which apparatus they say is a very different apparatus from that described in the letters patent and in the specification annexed thereto.

And these defendants, further answering, say that they deny that they ever contrived to injure said complainant or to defraud her of any profits, benefits, and advantages whatsoever; and these defendants, answering specially and specifically to so much of said bill of complaint as requires them to answer the number of barrels of beer they have manufactured under the alleged patented process claimed by said complainants as covered by her said letters patent, as well as the number of apparatus they have used in applying said process, say that they have not manufactured any beer whatever by any process other than that last above described as being used by them, and by such process, as near as defendants are now
28 able to tell, they have manufactured since May 20th, 1879, about — barrels of beer.

The defendants are not using and have not used any apparatus such as is mentioned and described in complainant's letters patent.

All which matters and things these defendants are ready and willing to aver, maintain, and prove as this honorable court shall direct, and humbly pray to be hence dismissed with their reasonable costs and charges in this behalf most wrongfully sustained.

HARRINGTON & HOWE,
DUNCAN, SMITH & DUNCAN,
Solicitors for Defendants.

And afterwards, to wit, in recess of said court, on the 4th day of October, 1884, the following further proceedings in the above-entitled cause were had, to wit:

Comes now the defendant, Casper J. Maus, by Messrs. Harrington and Howe and Messrs. Duncan, Smith and Duncan, his solicitors, and files his answer herein in the words following, to wit:

The respondent herein, Casper J. Maus, for his separate answer to the bill of complaint, says that he is ignorant as to all matters and things therein set out, except that part thereof which charges that this defendant is doing business under the firm name and style

of C. Maus in the city of Indianapolis; and that since the granting of the letters patent sued on, No. 215,679, this respondent, at Indianapolis, used and still continues to use said alleged invention. As to said part of said bill, this respondent, answering, says that he is not now, and has not been since the issuing of said letters
29 patent, a member of the firm of C. Maus, in said city of Indianapolis, and is not and has not been doing business under the firm name and style of C. Maus, and that he has not, at Indianapolis, as in said bill charged, either alone or with others, since the granting of said letters patent No. 215,679, used said invention upon which complainants claim is patented, as set out in the bill, and has not used, as in said bill charged, any similar invention, and is not now using said invention or any similar invention, and no injury has resulted to complainants by any use of said alleged invention by this respondent, and no profits have accrued to this respondent by using said invention, as charged in said bill.

And in answer to interrogatory No. 1 he says he has not manufactured any beer under said patented process.

And these matters he is ready to verify in the manner the court shall order, and he prays he may go hence & recover his costs.

CASPER J. MAUS.

HARRINGTON & HOWE, *Solicitors.*

STATE OF INDIANA, } ss:
Marion County, }

This — day of ——, 1881, personally appeared Casper J. Maus, defendant above named, and, being by me duly sworn, de-
30 poses and says that he has heard the foregoing answer read and that the same is true to the best of his knowledge and belief.

——.

Subscribed and sworn to before the undersigned, notary public in and for said county and State, this — day of ——, 1881.

——.

And afterwards, to wit, in recess of said court, on the 5th day of October, 1881, the following further proceedings in the above-entitled cause were had, to wit:

Comes now the complainant, by Messrs. Banning & Banning, its solicitors, and files its replication herein in the words following, to wit:

Replication.

The replication of the New Process Fermentation Company, complainant, to the answer of Magdalena Maus, Albert C. Maus, Casper J. Maus, Frank A. Maus, and Mathias A. Maus, defendants.

This replaint, saving and reserving unto itself, now and at all times hereafter, all and all manner of benefit and advantage of exception which may be had or taken to the manifold insufficiencies

of the said answer, for replication thereunto says that it will aver, maintain, and prove its said bill of complaint to be true, certain, and sufficient in law to be answered unto, and that the said answer of the said defendants is uncertain, untrue, and insufficient to be replied unto by this replaint, without this, that any other matter or thing whatsoever in said answer contained material or effectual in the law to be replied unto, and not herein and hereby well and sufficiently replied unto, confessed or avoided, traversed or denied, is true; all which matters and things this replaint is and will be ready to aver, maintain, and prove as this honorable court shall direct, and humbly prays as in and by its said bill it has already prayed.

BANNING & BANNING,
Solicitors for Complainant.

And afterwards, to wit, at the November term of said court, 1881, on the the 4th day of February, 1882, before the Honorable
31 Walter Q. Gresham, judge as aforesaid of said court, the following further proceedings in the above-entitled cause were had, to wit:

Come now the defendants, by Duncan, Smith & Duncan, their solicitors, and upon their motion it is ordered that Eugene G. Kreider, Esq., of the city of Indianapolis, be and he is hereby, appointed special examiner in chancery in this cause, and is empowered to cause to come before him, at the office of Duncan, Smith & Duncan, No. — East Washington street, in said city, upon proper notice given to the complainant, the witnesses of the defendants, and to take their depositions in writing and return the same duly certified into this court, addressed to the clerk thereof, at Indianapolis.

And afterwards, to wit, at the November term, 1881, of said court on the 23d day of February, 1882, before the Honorable Walter Q. Gresham, judge as aforesaid of said court, the following further proceedings in the above-entitled cause were had to wit:

On motion of the defendants' solicitors it is ordered that the defendants' time for taking proofs in this cause be extended sixty days.

And afterwards, to wit, at the May term of said court, on the 12th day of June, 1884, before the Honorable Thomas
32 Drummond and the Honorable William A. Woods, judges of said court as aforesaid, the following further proceedings in the above-entitled cause were had, to wit:

This case having been heretofore argued by the counsel of the respective parties and considered by the court, it is ordered that the bill in this case be dismissed for want of equity, at the costs of the plaintiff to be taxed; and the plaintiff thereupon prays an appeal to the Supreme Court of the United States, which is granted upon its giving bond according to law.

Here follows the opinion of the court:

DRUMMOND, *J.:*

Nearly all the claims in this case, as well as the specifications, speak of the beer in what is called the kraeusen stage. The specifications term "kraeusen" young beer, and also use the words "kraeusen stage," the inference being that it refers to that condition of the beer when it is considered young; but in the evidence of the plaintiff one of the witnesses particularly describes what the kraeusen stage is. He calls kraeusen a fermenting sweet beer wort during the first stage of the main fermentation, in which a foam of a very dense, curly, white appearance is formed on the surface, and it is so termed because the beer has the appearance of curling, as kraeusen in German means "curls." The kraeusen stage, he declares, is the new fermentation which sets in after the "kraeusen beer" has been added. Under the old method, when the beer was in this condition, in shavings casks and the bung was left open the foam and some of the ingredients of the beer escaped through the bung-hole. As claimed in the plaintiff's patent, this was avoided by stopping up the bung-holes and devising a method by which the carbonic acid gas formed in the fermentation was permitted to escape upon a certain pressure, which removed the danger that otherwise would exist of bursting the casks or of injuring the beer when in fermentation or while being clarified.

All the claims except the last, it is insisted by the plaintiff, are for a process, and that as to them the particular manner or instrumentalities by which the process is accomplished are immaterial.

It is well known that the term "process" is not used in the statute, but it has been uniformly held that there may be a patent for a process because it is regarded as an art, which is a word used in the statute; but it must be confessed that it is often one of the most difficult questions to decide, in the practical application of claims made in a patent, what is a process which may be the subject of a patent. To illustrate and prove this it is only necessary to refer to the case of Tilghman *v.* Mitchell, 19 Wall., 287, which was
33 most elaborately argued and fully considered, and where a majority of the court held that although the manufacture of fat acids and glycerine from fatty or oily substances by the action of water at a high temperature and pressure was a process, yet that the patentee was limited to the particular method or means of applying highly-heated water under pressure, pointed out in the specifications, although the claim was on its face broader than that, and to the case of Tilghman *v.* Proctor, 102 U. S., 707, where the same patent was in question, and where the court held that it was a patent for a process, irrespective of the particular mode or form of apparatus for carrying it into effect. If, then, we now consider this last case in connection with one of the first cases decided by the Supreme Court, Corning *v.* Burden, 15 How., 252, and some of the intervening cases where patents have been sustained for a process, we ought to be able to determine the rule established by that court as to what is a process for which a patent can issue. In Corning *v.* Burden the court said that one might discover a new and useful

improvement in the process of dyeing, tanning, etc., irrespective of any particular form of machinery or mechanical device, and another might invent a labor-saving machine by which the same process might be performed, and each might be entitled to his patent; that one, by exposing india-rubber to a certain degree of heat in mixture or connection with certain metallic salts, might produce a valuable product and be entitled to a patent for his discovery as a process or improvement in the art, irrespective of mechanical devices; and another might invent a furnace or stove or some apparatus by which the same process might be carried on with a saving of labor and of expense, and he would be entitled to a patent for his machine as an improvement in the art, and yet one could not have a patent for a machine nor the other for a process. Each would be entitled to a patent for the method of producing certain results, but not for the result itself.

And the court further stated that it was when the term "process" was used to represent the means of producing a result that it was patentable, and it would include all methods or means not effected by mechanism. This definition is intelligible. A part of it, but not the whole, is cited in Tilghman *v.* Proctor.

In Corning *v.* Burden the court held that Burden had not discovered any new process, but a new machine or combination of mechanism, by which the result was produced. In McClurg *v.* Kingsland, 1 How., 202, where the only change made in the method of casting iron rolls was by directing the metal into the mold when in a liquid state at a tangent, the patent was sustained, although there does not seem to have been much discussion directly upon the patentability of the claim. All that was done in that case was simply to change the direction of the tube which carried the metal into the mold, the old method being to convey it from the furnace to the mold in a horizontal or perpendicular direction. In Mowry *v.* Whitney, 14 Wall., 620, and Tilghman *v.* Proctor, already referred to, the court sustained the claim in each as a patent for a process. In the latter case the court says that the patent law is not confined to new machines and new compositions of matter, but extends to any new or useful art and manufacture, and that a manufacturing process is an art.

Goodyear's patent was for a process, namely, vulcanizing india-rubber. The apparatus for performing the process was not material and was not patented, and the court then refers to Neilson's English patent. Neilson's patent was for the discovery which he made of applying a blast of hot air instead of cold to a smelting-furnace, and for describing a method by which that was accomplished, that method not being material; and the court declares that Neilson's patent was sustained as a process patent, and quotes the language of the court of exchequer—"that the plaintiff did not merely claim a principle, but a machine embodying a principle, and a very valuable one;" and also the language of Lord Campbell in the House of Lords—that "the patent must be taken to extend to all ma-
34 chines of whatever construction whereby the air is heated intermediately between the blowing apparatus and the blast-

furnace;" and therefore it was unnecessary to compare one apparatus with another.

The court, in Tilghman *v.* Proctor, also quotes the language of Chief Justice Taney, in O'Reilly *v.* Morse, 15 How., 112, where he says, in commenting on Neilson's case, "that the manner in which air might be heated was immaterial." "His patent was supported, because he (Neilson) had invented the mechanical apparatus by which the current of hot air could be thrown in. * * * The interposition of a heated receptacle in any form was the novelty he invented." And after quoting still further from the opinion of the Chief Justice in O'Reilly *v.* Morse the court states: "It seems to us that this clear and exact summary of the law affords the key to almost every case that can arise. Whoever discovers that a certain useful result will be produced in any art by the use of certain means is entitled to a patent for it, provided he specifies the means. * * * It is very certain that the means need not be a machine or an apparatus; it may be, as the court says, a process. A machine is a thing; a process is an act or a mode of acting. * * *

"The mixing of certain substances together, or the heating of a substance to a certain temperature, is a process. If the mode of doing it, or the apparatus in or by which it may be done, is sufficiently obvious to suggest itself to persons skilled in the particular art it is enough in the patent to point out the process to be performed without giving superogatory directions as to the apparatus or method to be employed."

The majority of the court, in O'Reilly *v.* Morse, refused to sustain the 8th claim of Morse, because he disavowed the specific machinery or means mentioned, but claimed the use of the motive power of the electric current, however developed, and this was held to be a principle simply.

There has always been some difference of opinion as to the true grounds upon which this rejection of the 8th claim of Morse was placed, it being maintained by some that Morse was not entitled to have a patent, including all applications of what he termed electromagnetism in the transmission of words, letters, and signs, but only his own particular application.

It has been uniformly held that a patent for a mere principle, or what is sometimes called a law of nature, cannot be sustained; but in all the cases referred to, from the Neilson to the Tilghman patent, the law or laws of nature discovered were utilized, and it is said that in giving this construction to principle and process a patent for a process leaves the field open to future inventors, whereas a patent for a principle or a law of nature would give a monopoly to the person making that discovery; so that the rule established by the Supreme Court is said to be that the patent for a process will include every application of the principle that involves the use of the process described and claimed by the patentee; and this does not include the particular machinery or apparatus described by the patentee, but the mode of operation which is carried out by means of the apparatus. Walker on Pat., sec. 14.

In Neilson's case the defendant did not use the means employed

by Neilson in throwing the hot air to the smelting furnace, for it was admitted he used a better device, but it was assumed that when once the idea existed in the mind of the superiority of a hot-air blast to a cold one any person skilled in smelting could devise his own mode of introducing the hot air to the furnace. And see Cochrane *v.* Deener, 94 U. S., 780, and Rubber Co. *v.* Goodyear, 9 Wall., 796.

It is to be regretted that the difficulty inherent in the subject is so great that a more intelligible distinction has not been made, for it must be admitted that the application of the rule which has been established by the Supreme Court to other cases as they hereafter arise may cause embarrassment, for there must be a method by which the principle or law which has been discovered is applied, and if that method is immaterial then it is difficult to understand why it does not become substantially a patent for the dis-
35 covery of the principle or the law of nature. Such seems to have been the opinion of Mr. Justice Nelson. See Foote *v.* Sillsbury, 1 Blatch., 445, and 2 Blatch., 260; and the case on appeal, 20 How., 378; and Le Roy *v.* Tatham, 14 How., 156, and 22 How., 132.

If it be true that the defendants have used the mechanical devices of the plaintiff, the question is whether, within these cases and the rules which have been established upon the subject, the plaintiff is entitled, under his patent, to the claims which he has made and as set forth, namely, the process of preparing beer for the market by holding it under controllable pressure of carbonic acid gas when in the kraeusen stage; the process of treating it when in the kraeusen stage by holding it in a vessel under automatically controllable pressure of carbonic acid gas; the process of preparing and preserving beer for the market, holding it under controllable pressure of carbonic acid gas from the beginning of the kraeusen stage until it is transferred to casks and bunged; to the method of preserving beer; to the process of treating it when in the second fermenting stage and the process of treating it in the course of its manufacture, and to the process of clarifying and settling beer in a series of shavings casks and equalizing the rate of fermentation in all of them, whereby the beer is more rapidly and thoroughly clarified, irrespective of the mechanical means by which the specifications declare these various processes can be accomplished—that is to say, were Meller & Hofmann the first persons to hold the beer when in its kraeusen stage under controllable pressure of carbonic acid gas, and were the means by which that result was accomplished immaterial?

There is not entire accord among the witnesses as to what constitutes the kraeusen stage, but we may assume that it was understood to be when the beer was in that condition in the shavings casks that young beer was added, upon which fermentation was produced, and during which the process of clarification was going on, in addition to other results caused by the mode adopted to act upon the beer, because, as soon as the fermentation began by the introduction of the kraeusen, the shavings operated upon the ingredients contained in the beer.

Where, in a process, there is a combination of different substances,

and to that combination another substance or element is added by which a new result is obtained, that is a process which we can easily understand; and, if unknown before, and it is useful, the person devising it may be entitled to a patent.

Where there is a result produced by machinery, which result may be brought about by a process, and which may consist of different steps caused by a combination of different parts of the machine, and another part is added before unknown and by which a useful result is produced, that we can understand. The difficulty is to comprehend a process which may consist partly of a combination of different substances operating chemically and the combination of different parts of a machine operating mechanically.

If a process exists which consists of different steps created by machinery, and there is an improvement in that process caused by a new element added to or taken away from the machinery, then the process existing and being known, the party who added or took away the part of the machinery might, if it were useful, be entitled to a patent, not for the process which formerly existed and was well known, but only for that which had been added to or taken from the mechanism. To apply the principle to this case: The process of manufacturing beer was not, at the time this patent was issued, *per se* patentable, for beer had long been manufactured; in the first place, by the preliminary steps which are referred to in the specifications, and which have already been mentioned, and by adding to the beer the kraeusen while it was in shavings casks, and then permitting fermentation to proceed, then clarifying it so as to retain in the beer some of the carbonic acid gas, which of itself constituted an important ingredient in the beer, and then preparing it for the market, so that, whatever was patentable in the process
36 of manufacturing beer must consist of something new and useful being added to the process, chemically or mechanically, and for whatever was new and useful the inventor might be entitled to a patent, whether it was connected with the chemistry or the mechanism of the process. It is very important to observe this distinction in discussing the patentability of a process.

It seems to be admitted in the various process cases decided in the Supreme Court which have been referred to, and others which might be named, if it consists of a chemical combination by which the particular result is produced, that does not prevent another inventor from making a mechanical combination which produces the same result; otherwise there would be a revolution in what has always been understood to be a principle of the patent law, that a person could not patent a result, but only the means or acts by which the result was produced, and that certainly should be true as well of a chemical as a mechanical combination.

It will be borne in mind that the patentee in this case insists that the invention is not limited to the particular instrumentalities described by which the beer is held under controllable pressure of carbonic acid gas when in the kraeusen stage, because it is said that other means than a water column may be adopted for equalizing the pressure of the gas without departing from the spirit of the in-

vention—as, for example, safety-valves, springs, and the like—and it is added that the apparatus is susceptible of many other variations without affecting the process itself. Now, a water column had been previously used to regulate the pressure of the carbonic acid gas, and valves and springs had often been used also to regulate its pressure, and indeed some of the witnesses of the plaintiff seem to imply that the Wallace and Hicks devices, in use long before the plaintiff's patent, were, in their application to the manufacture of beer, like those of the plaintiff.

I am, therefore, not prepared to concede that Meller and Hofmann were the first to hold under controllable pressure of carbonic acid gas the beer when in the kraeusen stage, for, as already stated, that had been done as well by a column of water as by springs and valves when the shavings casks were bunged and stopped, and the gas was permitted to escape when the pressure became so great as to raise the valve or force the spring. This is shown by the evidence of Maus and Sturm. It may be admitted that the mode adopted by the plaintiff is valuable, and that it has facilitated the manufacture of beer, both as to quality and as to time; but it seems to me that this has been caused by the more complete mechanical devices of the plaintiff, without really changing the principles upon which beer had been theretofore manufactured.

No new principle or scientific fact has been discovered, as was true in the process patents which have already been referred to. The most that can be claimed is, and indeed the chief merit ascribed to the patent by the plaintiff's counsel is, that it applies the controllable pressure created by the carbonic acid gas in a state of fermentation at an earlier stage than was before known; but the essential parts of the apparatus used by the patentee were known before, and the same controllable pressure had been applied at various stages of the manufacture, and the application at the one stage of the condition of the beer instead of another would seem not to involve anything more than a mere mechanical change which could be employed by any one skilled in the art.

If we assume that the invention of a process always authorizes a patent irrespective of the means by which the result is produced, it would seem to be attended with very important and far-reaching consequences, and to involve substantially a monopoly of the principle or of the discovery of a new scientific fact, and in this way we would impair, if not destroy, the effect given by the Supreme Court to the various rules which have been heretofore referred to as established by that Court, one of which has always been held to be
37 firmly fixed, namely, that a person should only have a patent for the means by which the result is produced, and not for the result itself.

It follows, therefore, from what has been said, that the claims of the plaintiff for a particular process, irrespective of the means by which that process has been reached, cannot be sustained, and that the effort made to enlarge the construction of the patent law so as to cover any means which may be used in the process of the manufacture of beer, namely, by the methods which have been heretofore

substantially employed, cannot succeed. It being a process well known before, a person could only have a patent for that by which the process was improved or cheapened, and it cannot be successfully claimed, I think, that the defendants have used the various mechanical devices which are set forth in the specifications. It is not necessary, perhaps, to declare in this case that that those devices taken in the aggregate might not be the subject of a patent as mechanical improvements in the manufacture of beer, but it is clear, if patentable at all, then it is only as such mechanical devices; the result is the plaintiffs' case fails on both grounds on which it is put—first, as a patent for a process as described and claimed; and, secondly, for an infringement of the mechanical devices of the patent. The bill must be dismissed.

Testimony.

The following certificate of evidence was filed on the 23d day of July, 1884.

I hereby certify that at the hearing of this cause said parties respectively produced, read, and used in evidence the following depositions and exhibits, to wit:

As its *prima-facie* evidence the complainant read the depositions of George Bartholomae and Otto Zwietusch, the Meller and Hofmann [patent], No. 215,679; assignment of said patent from George Bartholomae to the New Process Fermentation Company, and the charter of said company; all which depositions and exhibits are as follows:

38 *Complainant's Prima-Facie Evidence.*

Testimony taken in behalf of the complainant in the above-entitled cause, at the office of Messrs. Banning & Banning, Nos. 60 and 61 Honore building, corner Dearborn and Adams streets, Chicago, Illinois, before Charles C. Linthicum, notary public, October 29, 1881, pursuant to the notice hereto attached.

Present: Ephraim Banning, Esq., of counsel for complainant, and A. G. Howe, Esq., of counsel for defendants, the latter appearing for the purpose of cross-examination and reserving all rights to object to the evidence for all manner of reasons, and for the reason especially of the taking of the evidence before a notary public who has not been appointed for said purpose.

Counsel for complainant offers in evidence the following instruments, viz:

1 The charter of the New Process Fermentation Company, dated at Springfield, Illinois, January 31, 1880, and recorded in the recorder's office of Cook county, Illinois, February 7, 1881, in book 5 of corporations, page 426.

STATE OF ILLINOIS, *Department of State:*

George H. Harlow, secretary of state, to all to whom these presents shall come, Greeting:

Whereas a statement duly signed and acknowledged having been filed in the office of the secretary of state, on the eighth day of January, A. D. 1880, for the organization of the New Process Fermentation Company under and in accordance with the provisions of "An act concerning corporations," approved April 18th, 1872, and in force July 1st, 1872, and all acts amendatory thereof, a copy of which statement is hereto attached;

And whereas a license having been issued to George Bartholomae, Philip C. Dyrenforth, John J. Voelcker, as commissioners, to open books for subscription to the capital stock of the said company;

And whereas the said commissioners having, on the thirty-first day of January, A. D., 1880, filed in the office of the secre-
39 tary of state a report of their proceedings under the said license, a copy of which report is hereto attached:

Now, therefore, I, George H. Harlow, secretary of state of the State of Illinois, by virtue of the powers and duties vested in me by law, do hereby certify that the said New Process Fermentation Company is a legally organized corporation under the laws of this State.

In testimony whereof I hereto set my hand and cause to be affixed the great seal of the State.

Done, at the city of Springfield, this thirty-first day of January, A. D. 1880, and of the Independence of the United States the one hundred and fourth.

[Seal of the State of Illinois, Aug. 26th, 1818.]

GEORGE H. HARLOW,
Secretary of State.

STATE OF ILLINOIS, } ss:
Cook County, }

To George H. Harlow, secretary of state:

We the undersigned, George Bartholomae, Philip C. Dyrenforth, and John J. Voelcker, propose to form a corporation under an act of the General Assembly of the State of Illinois, entitled "An act concerning corporations," approved April 18th, 1872, and all acts amendatory thereof, and that for the purposes of such organization we hereby state as follows, to wit:

1. The name of such corporation is the New Process Fermentation Company.

40 2. The object for which it is formed is to carry on business under United States patent No. 215,679, May 20th, 1879, to Meller & Hofmann, George Bartholomae, assignee, involving a certain new art or improvement in the fermentation and manufacture of beer and under other patents appertaining thereto.

3. The capital stock shall be sixty thousand dollars.

4. The amount of each share is one hundred dollars.

5. The number of shares [is] six hundred.

6. The location of the principal office is in Chicago, in the county of Cook, State of Illinois.

7. The duration of the corporation shall be twenty years.

GEORGE BARTHOLOMAE.
PHILIP C. DYRENFORTH.
JOHN J. VOELCKER.

STATE OF ILLINOIS, } ss:
County of Cook, }

I, W. F. Dummer, a notary public in and for the county and State aforesaid, do hereby certify that on this seventh day of January, A. D. 1880, personally appeared before me George Bartholomae, Philip C. Dyrenforth, and John J. Voelcker, to me personally known to be the same persons who executed the foregoing statement, and severally acknowledged that they executed the same for the purposes therein set forth.

41 In witness whereof I have hereunto set my hand and seal the day and year above written.

[SEAL.] W. F. DUMMER,
Notary Public.

To Hon. George H. Harlow, secretary of state of the State of Illinois:

The commissioners duly authorized to open books of subscription to the capital stock of New Process Fermentation Company, pursuant to license heretofore issued, bearing date the eighth day of January, A. D. 1880, do hereby report that they opened books of subscription to the capital stock of said company, and that the said stock was fully subscribed; that the following is a true copy of such subscription, viz:

We, the undersigned, hereby severally subscribe for the number of shares set opposite our respective names to the capital stock of New Process Fermentation Company, and we severally agree to pay the said company on each share the sum of one hundred dollars.

Names.	Shares.	Amount.
George Bartholomae	540	$54,000
Philip C. Dyrenforth	30	3,000
Ephraim Banning	15	1,500
Thomas A. Banning	15	1,500

That on the thirtieth day of January, 1880, at the office of Banning and Banning, in Chicago, at the hour of ten o'clock a. m., they convened a meeting of the subscribers aforesaid, pursuant to notice required by law, which said notice was deposited in the post

42 office, properly addressed to each subscriber, ten days before the time fixed therein; a copy of which said notice is as follows, to wit:

To —— ——:

You are hereby notified that the capital stock of the New Process Fermentation Company has been fully subscribed, and that a meeting of the subscribers of such stock will be held at the office of Banning and Banning, No. 147 Randolph St., Chicago, Illinois, on the 30th day of January, A. D. 1880, at ten o'clock a. m., for the purpose of electing a board of directors for said company and for the transaction of such other business as may be deemed necessary.

GEORGE BARTHOLOMAE,
PHILIP C. DYRENFORTH,
Commissioners.

That said subscribers met at the time and place in said notice specified and proceeded to elect directors, and that the following persons were duly elected for the term of one year, as follows: George Bartholomae, P. C. Dyrenforth, Ephraim Banning.

GEORGE BARTHOLOMAE,
PHILIP C. DYRENFORTH,
Commissioners.

STATE OF ILLINOIS, } *ss:*
County of Cook, }

On the 30th day of January, 1880, personally appeared before me, a notary public in and for said county, in said State, George Bartholomae and Philip C. Dyrenforth, and made oath that the foregoing report by them subscribed is true in substance and in fact.

43 [SEAL.] W. F. DUMMER,
Notary Public.

No. 256,148. Recorded Feb'y 7th, 1880, at 9 a. m.
JAS. W. BROCKWAY, *Recorder.*

STATE OF ILLINOIS, } *ss:*
County of Cook, }

I, James W. Brockway, recorder of deeds in and for said county, in the State aforesaid, do hereby certify that the annexed is a true and correct copy of the record of a certain instrument filed in my office the seventh day of February, A. D. 1880, as document No. 256,148, and recorded in book 5 of corporations, at page 426.

In testimony whereof I have hereunto set my hand and affixed my official seal, at Chicago, this fifteenth day of July, 1884.

[SEAL.] JAS. W. BROCKWAY, *Recorder.*

44 Counsel for defendants objects to the articles of incorporation of complainants, because the certificate is not sufficient.

2. Letters patent of the United States No. 215,679, dated May 29, 1879, issued to George Bartholomae, as assignee of Leonard Meller and Edmund Hofmann, being the letters patent sued on, and a copy of which is attached to the bill of complaint in this cause.

3. A certified copy of the assignment under said letters patent No. 215,679 from George Bartholomae to the New Process Fermen-

tation Company, dated February 19, 1880, and recorded in the United States Patent Office February 24, 1880, in Liber B 25, page 244.

"In consideration of one dollar and other good and valuable considerations, to me in hand paid by the New Process Fermentation Company, a corporation duly organized and existing under and by virtue of the laws of the State of Illinois, the receipt whereof is hereby acknowledged, I hereby sell and assign to the said New Process Fermentation Company all my right, title, and interest in and to letters patent of the United States No. 215,679, dated May 20th, 1879, granted to George Bartholomae, as the assignee of Leonard Meller and Edmund Hofman, for an improvement in processes for making beer, and in and to all claims of every kind for the past infringement of said letters patent, and all rights of action whatever arising out of or connected with said infringements; the same to be held, enjoyed, and collected by the said New Process Fermentation Company to the full end of the term for which said letters patent are granted or may be extended, as fully and entirely as the same would have been held, enjoyed, or collected by me if this assignment and sale had not been made.

In testimony whereof I have hereunto set my hand and seal this nineteenth day of February, A. D. 1880.

GEORGE BARTHOLOMAE. [SEAL.]

Witness:
P. C. DYRENFORTH.

U. S. PATENT OFFICE.

Received for record Feb. 24, 1880. Recorded [in] Liber B 25, page 244. Ex'd: F. C. T.

OTTO ZWEITUSCH, a witness produced, sworn, and examined on the part of complainant, deposes and testifies as follows in answer to questions by Mr. BANNING:

Q. 1. State your name, age, residence, and occupation.

A. Otto Zweitusch; forty-nine years of age; Milwaukee, Wisconsin; manufacturer of soda-water apparatus and similar machinery.

Q. 2. State what position, if any, you hold in the New Process Fermentation Company.

A. I am manager and secretary. I am familiar with its business generally.

Q. 3. Are you familiar with the apparatus and process of treating beer described and claimed in the complainant's letters patent, No. 215,679, sued on in this cause?

A. Yes; I am. I am very well acquainted with both the apparatus and process.

Q. 4. Are you familiar with the art of brewing beer, including the use of bunging apparatus, of which the Meller and Hofmann invention is an example? If so, please state what opportunities you have had for becoming so.

A. Yes; I am. I had a brewery eighteen years ago myself. I am a practical machinist, and am in the habit of putting up such bung-

ing apparatus and giving necessary instructions as to its use. I have invented and have patents for apparatus for the same purpose. From my position and work in the New Process Fermentation Company I am required to be very familiar with the whole subject of bunging apparatus, and I think I understand all the different kinds of bunging apparatus in existence and in use in the United States.

Adjourned to Monday, October 31, 1881, at 10 o'clock a. m.

MONDAY, *October* 31, 1881.

Present: Thomas A. Banning, of counsel for complainant; A. G. Howe, Esq., of counsel for defendants, and the witness.

Examination of OTTO ZWEITUSCH continued:

Q. Are you acquainted with any of the defendants in this cause; and, if so, which of them?

46 A. I am acquainted with three of them; have seen them two times in their office, but do not know their given names. There are three brothers.

Q. 6. Were you ever at the defendants' brewery before this suit was commenced?

A. I was; the latter part of October, 1880.

Q. 7. State whether you then had any conversation with the defendants, or either of them, about their use of the process or apparatus for treating beer now claimed to be an infringement of the complainant's patent. If you had any such conversation, please state fully what was said.

A. The time I went there first I asked them whether they were using bunging apparatus in their brewery by which the pressure of the carbonic acid gas was regulated automatically by a water column. They said, Yes, we have an arrangement similar to that which I represent for the New Process Fermentation Company—using it on twenty-four shavings casks. Then I informed them that they infringed the patent of Meller and Hofmann, of which the New Process Fermentation Company is the owner. One of those gentlemen said to me that they had applied for a patent themselves and did not want to do anything about taking license from the company until they knew something particular from Washington. The second time I was in their office—some time after—one of those gentlemen made me a little sketch showing in what manner their arrangement was working. I did not find any difference in the results by such an arrangement by their apparatus than in the Meller and Hofmann patent.

Q. 8. From that sketch which they showed you and the explanation which they gave you, please state briefly the object for which the apparatus was used and the manner in which they used it.

A. The object is for clarifying the beer more rapidly and ripening the beer for the market quicker and better by having a constant pressure, or equal pressure, in the shavings casks during the clarifying process. From the sketch shown me, I found that each shavings cask was connected with a pipe which was leading to a kind of

closed reservoir or tank; from this tank another pipe led to the top of a water column, from which point all those shavings casks run in by outlet to the bottom of the water column.

Q. 9. State wherein, if at all, the apparatus and process which defendants were using in their brewery differs from the apparatus and process described in the Meller and Hofmann patent sued on in this cause.

A. The process does not differ at all, neither the working of the apparatus. The apparatus itself only differs from that of Meller and Hofmann by having a reservoir or closed tank between the connection-pipe from shavings casks to the water column.

Q. 10. In your opinion, does the defendants' mode of treating beer as applied at their brewery, and as they described it to you, embrace and apply the invention described and claimed in patent No. 215,679, sued on in this cause? If you say it does, please point out which claims you consider defendants infringe by its use.

A. Yes, it does, in my opinion. It infringes the first, second, third, fourth, sixth, and seventh claims. I cannot say about the fifth and eighth claims particularly.

Q. 11. Has the process of treating beer under antomatically controllable pressure of carbonic acid gas, as described in the Meller and Hofman patent, come into general use or not, and is it of any considerable value or importance in the brewing business?

47 A. It is of great value in the brewing business, and has come into general use; it is put up by the company and the prior owner of the patent in almost eighty breweries, many of which are among the largest in the United States.

Cross-examination by Mr. HOWE:

X Q. 1. What position do you hold in the plaintiff company?

A. I am secretary and manager.

X Q. 2. How long have you held that position?

A. Since about April, 1880.

X Q. 3. Are you a stockholder in the company?

A. I am.

X Q. 4. Are you familiar with the process of brewing beer and preserving beer by holding it under automatically controllable pressure of carbonic acid gas?

A. Yes, sir.

X Q. 5. Are you familiar with the process and principles involved in the letters patent sued on?

A. Yes, sir.

X Q. 6. Have you ever had any experience in mechanism as a mechanic?

A. I have, since my fourteenth year.

X Q. 7. If I understand you, you are not able to say that the plaintiff's claim No. 8 is infringed by the defendants?

A. I am not able to say on account of not having seen the apparatus or examined it in operation.

X Q. 8. Under the plaintiff's patent and claim, do they claim the invention in the process of manufacturing beer and preserving beer

for the market under automatic pressure of carbonic acid gas, in all its stages?

A. Yes, sir.

X Q. 9. Look at plaintiff's claim number three. Is not the whole process, from the beginning to the end of manufacturing beer and preserving it after manufactured for the market, embraced in that single claim?

A. It is not.

X Q. 10. What is the kraeusen stage of the beer?

A. The kraeusen stage of the beer is after it is taken from the ruh-casks into the shavings casks and young beer, or kraeusen, is added for the purpose of refermentation of the beer, clarifying the same, and making it suitable for the market.

X Q. 11. May the plaintiff's process be used on single casks or upon a series of casks?

A. It is no matter where it is used, the effect is the same.

X Q. 12. Will the plaintiff's process be preserved in all different mechanical constructions which hold beer in closed casks under controllable pressure of carbonic acid gas?

A. During the time of manufacturing the beer, yes.

X Q. 13. Will the process be preserved after the beer is manufactured, by holding it under such pressure of carbonic acid gas?

A. Yes; that is involved, too.

X Q. 14. Will any arrangement or apparatus by which the beer is held in closed casks under controllable pressure of carbonic acid gas embody the principle set forth in the plaintiff's claim?

A. Yes, it will.

X Q. 15. Then the plaintiff claims all processes of manufacturing and holding beer under controllable pressure of carbonic acid gas, by whatever apparatus that may be accomplished?

A. Yes, sir.

X Q. 16. Would an apparatus constructed with a metal spring instead of a water column, which spring would yield to the excessive pressure of carbonic acid gas and would control and hold the gas in the cask when not excessive, embody the plaintiff's process substantially?

A. If such an apparatus with such a spring will work automatically, yes.

48 X Q. 17. Suppose shavings casks to be supplied with bungs in which there is a valve, and the valve to be held down by a wire or metal spring, which spring will yield if the gas becomes excessive and allow the gas to escape; or, if there is not an overcharge of gas, will keep the valve closed, thereby keeping the carbonic acid gas in the cask, would such an arrangement embody substantially the plaintiff's claim and process?

A. Yes.

X Q. 18. Suppose an apparatus constructed with a rubber spring, but otherwise substantially as detailed in my last question, would that also embody the plaintiff's process and claim?

A. If it works automatically, yes.

X Q. 19. Would not a rubber or wire either, that would hold a

valve down until the cask was charged sufficiently with carbonic acid gas to force the spring or rubber up, be as much of an automatic arrangement as a water column which held the gases in or allowed them to escape when overcharged?

A. It is an automatic arrangement only while it is in first-class order, but rubber and spring will never regulate as well as a water column.

X Q. 20. Suppose the pipe that enters the water column at its base, instead of entering at the base should enter at the top, but extend through the column of water to near the base, would the effect and operation of the water column be the same as when the pipe enters at the base of the water column?

A. There is no difference whether it goes inside or outside of the water column, as long as it is lead near to the bottom of the column.

X Q. 21. Is the principle of the water column its weight by which the gas is obstructed or held down?

A. According to the height of the water column the pressure of the gas is regulated.

X Q. 22. How does the water column regulate the gas? Is it by obstructing the escape of the gas?

A. The overpressure, yes.

X Q. 23. Suppose an apparatus constructed in this way—the casks instead of being connected by short pipes, with a common pipe leading to the water column, there was a pipe running from one cask to the other cask, and then extended into the water column in such a way that if the gas in one cask was too much it could escape through the pipe directly into the other cask, and in either or both the gas should be too much, it could escape through the same pipes to the water column, and thus out through the water column—is such an apparatus and the principles therein the same substantially as set forth and claimed by plaintiffs in their patent?

A. That is the very principle claimed in this patent.

X Q. 24. Have the cocks anything to do with the principle of the process or the working of the apparatus, any further then to allow one, by turning them, to leave the pipes all open; or, if one cask should be emptied or taken off, or for any other purpose they should desire to close the pipes as to one or more, do the cocks cut any figure except for the purpose of closing the pipes in that way?

A. No, sir.

X Q. 25. Suppose two casks in which it is desired to keep the beer under controllable pressure of carbonic acid gas; suppose one pipe leading from one into the other, whereby gas may escape from either into the other, and the same pipe extending to the water column, as previously described; suppose the proper amount of water for regulating the gas is in the water column, will the
49 apparatus work the same with the pipes all open, and without any cocks?

A. It has to work the same, but it only requires to draw off such two casks at the same time.

X Q. 26. Does the principle of the several claims made by the plaintiff, except the eighth, consist in the keeping of beer while in

the process of manufacture, or, after manufactured, in preserving it, under automatic pressure of carbonic acid gas?

A. Yes.

X Q. 27. Suppose an apparatus constructed as follows: Two shavings casks with a pipe leading from one into the other, whereby the gas may escape from one into the other at will; suppose that pipe to be connected anywhere, either at its center or near one extreme, with another pipe which leads into a water column, will an apparatus constructed in that way be an infringement upon the claims of the plaintiff in the patent sued on?

A. Of course it is.

X Q. 28. Is that substantially the same as the plaintiff's?

A. Yes.

X Q. 29. Is there any claim on the size of the water column?

A. No.

X Q. 30. That makes no difference?

A. No.

X Q. 31. If an apparatus was constructed, then, in all particulars so as to be no infringement, unless the water column was an infringement, would the size or construction of the water column cut any figure?

A. No; the water column acts on a natural law; by having two feet of height of water, it will give accordingly one pound pressure, no matter whether the diameter is a quarter of an inch or ten feet.

X Q. 32. You are not able to state, if I understand you, the names of the gentlemen with whom you talked when at the defendants' brewery in Indianapolis?

A. I am not able to state their given names; I asked for Mr. Maus at my conversation and I was introduced to one of the brothers, who referred me to the principal one of them.

X Q. 33. Are you familiar with the Hicks patent?

A. Yes, I am.

X Q. 34. Would an apparatus constructed under and in pursuance of the Hicks patent and specification be an infringement of the plaintiff's patent?

A. If it is used during the manufacturing of beer to regulate automatic pressure of carbonic acid gas, yes.

X Q. 35. Is the principle of the Hicks patent substantially the same principle as the plaintiff's for controlling the beer?

A. It is not.

X Q. 36. What is the difference in the principle?

A. It is quite different in mechanical construction.

X Q. 37. Admitting that the mechanical construction is different, is the principle by which the beer is controlled under a pressure of carbonic acid gas the same, and, if not the same, why would there be an infringement by the use of the Hicks patent?

A. It is the same whenever it is used during the manufacturing of beer, and it acts as an automatic relief of carbonic acid gas.

50 R. D. Q. 38. Please state whether your answers to the various hypothetical questions proposed on cross-examination have all been given upon the assumption that the apparatus sup-

posed by defendants' counsel have been applied during the same stage, for the same purpose, and under the same conditions as those involved in the application of the complainant's process and apparatus.

A. Yes, sir; they have.

OTTO ZWIETUSCH.

GEORGE BARTHOLOMAE, being duly sworn, and examined on the part of complainant, in answer to interrogatories propounded by Mr. Banning, deposes and testifies as follows:

Q. 1. Please state your name, age, residence, and occupation.

A. George Bartholomae; age, thirty years; residence, Chicago; occupation, brewer.

Q. 2. How long have you followed the trade of brewing?

A. Since 1867.

Q. 3. How long have you followed the brewing trade in the United States?

A. Since 1870.

Q. 4. You are a member of the Bartholomae & Leicht Brewing Company, are you?

A. Yes, sir.

Q. 5. Also the president of the New Process Fermentation Company?

A. Yes, sir.

Q. 6. While you were engaged in brewing in the United States, prior to and up to the year 1877, did you ever hear of the use or application of an automatically controllable pressure, brought about by the accumulation of carbonic acid gas for the purpose of clarifying beer while in the kraeusen stage in shavings casks and ruh-casks?

A. No, sir.

Q. 7. Where did you first become familiar with that process or art?

A. When I was on a pleasure trip in Germany.

Q. 8. From whom did you learn it?

A. From Hofmann, in Manheim, Baden.

Q. 9. Were you thereupon or shortly afterwards appointed agent of Meller and Hofmann for the purpose of introducing the process and patenting the same in the United States?

A. I was, shortly after I came back to this country, appointed an agent for Meller and Hofmann.

Q. 10 When did the process first become introduced into the United States?

A. In 1877; in the end of July and commencement of August.

Q. 11. I think you are from Germany?

A. Yes, sir.

Q. 12. I see from the bill of complaint in this cause that a patent was issued to George Bartholomae, Chicago, Illinois, No. 201,982, for the same invention and discovery, substantially; is that George Bartholomae yourself?

(Counsel for the defendants objects to the question, because it assumes that the patent applied for is the same as one sued on.)

A. Yes.

Q. 13. How did you come to take out that patent in your own name. State briefly.

A. My attorney advised me to do so, because I had made an improvement on this apparatus, and I also had a contract with that party, so as I could take out the patent in my own name.

Q. 14. That is what he advised you?

A. That is what he advised me.

Q. 15. A contract with what party?

A. With Meller and Hofmann.

Q. 16. The present patent, which is issued to Meller and Hofmann, No. 215,679, was issued subsequently to the one to you, was it?

A. Yes.

51 Q. 17. Was there any interference in the Patent Office between the patent issued to yourself and the application afterwards made for the patent to Meller and Hofmann sued on in this cause?

(Counsel for defendants objects for the reason that matter of interference in the Patent Office Department can only be proven by this witness by hearsay testimony, or by writings that are hearsay, and that the above evidence from the Patent Office should be supplied.)

A. Yes, sir; there was. I gave up that patent which was issued to me for the benefit of Meller and Hofmann's patent.

Q. 18. That is, you conceded priority to them; is that what you mean?

(Counsel for defendants objects to the question because it is leading.)

A. Yes; I conceded priority.

Q. 19. And thereupon the patent was issued; is that the way of it?

A. The patent was then issued to Meller and Hofmann.

Cross-examination by Mr. HOWE:

X Q. 1. Who was your attorney?

A. The first time?

X Q. 2. Yes, sir; when you made your application.

A. Mr. F. W. Wolf, an architect of this city, was my attorney, and he took out the patent through Mr. Evans, in Washington.

X Q. 3. Did you have any other attorney or counselor in the matter?

A. No.

X Q. 4. At that time was Mr. Evans practicing law either in the Patent Office or in the State courts?

A. No; he was a patent solicitor.

X Q. 5. Did you make affidavit at that time that you were the original and first inventor?

A. Yes; I was instructed by my attorney at that time that if I

had made any change in this patent I could take out a patent in my own name.

X Q. 6. The extent of the instructions of your attorney to you were that you could take out a patent for any improvement that you had made?

A. No; he said I could take out in my own name a patent for the whole thing if I had made any improvement.

X Q. 7. You swore that you were the original and first inventor of the whole patent in that application, did you not?

A. Yes, I did. I was instructed by my attorney, as I said before.

X Q. 8. At that time did you know that, in fact, you were not the original and first inventor or discoverer of the process?

A. Of the process; no. I knew at that time I did not invent the process. I knew Meller and Hofmann were the first inventors.

X Q. 9. At that time, then, you knew that what you were swearing to was not true?

A. At that time I thought that when I had made a contract with Meller and Hofmann I had a right to do so.

X Q. 10. That is not the answer to my question. You will please answer directly the question put to you. Did you at that time know that you were swearing to what was not, in fact, the truth?

A. No.

X Q. 11. You did not know at that time, then, that you were not the first inventor?

A. I did not know at that time that I had no right to take out a patent in my own name.

X Q. 12. Please confine yourself to my question. Tell me,
52 now, directly, did or did you not know at the time you made the affidavit that you were not the inventor of the process?

A. I told you I was not the inventor of the process.

X Q. 13. Question 12 repeated.

A. I knew at that time I was not the inventor of the process, but I thought I had a right to do that. Of course, I was not at that time very familiar with the English language.

X Q. 14. Then, if you knew that you were not the first discoverer and inventor of the process at the time you made the affidavit and swore that you were the first inventor, you knew that you were swearing to what was not true, did you not.

A. I did not know anything about that. Of course, my attorney told me that, as soon as I made any change in the apparatus, I had a right to take out a patent in my own name.

X Q. 15. You say you were appointed agent for Meller & Hofmann; was that appointment in writing?

A. Yes.

X Q. 16. Where is the writing?

A. I guess it's in the hands of my attorney, and also it is recorded in Washington.

GEORGE BARTHOLOMAE.

The defendants then read in evidence the depositions of Henry Jameson, Jacob W. Loeper, Frank A. Maus, Mathais A. Maus

Clement A. Maus, Henry Sturm, and George Wallace; letters patent of the United States numbered, respectively, 62,581, 63,636, 90,349, 115,950, 201,982, 204,687, 205,572, 208,771, and 215,596, and the various publications, circulars, exhibits, and stipulations mentioned or referred to in said depositions and stipulations, all which depositions and exhibits are as follows:

53 *Defendants' Testimony.*

Testimony of Henry Jameson, M. D., Jacob W. Loeper, Frank A. Maus, George Wallace, and Mathias A. Maus, witnesses produced and sworn to before me, a special examiner in chancery, at the office of Duncan, Smith & Duncan, No. 76 East Washington street, Indianapolis, Indiana, on the 21st, 22nd, and 23rd days of February, 1882, pursuant to the enclosed order of the circuit court of the United States for the district of Indiana.

This testimony was taken on the part of the defendants in a certain action now pending in the circuit court of the United States for the district of Indiana, wherein The New Process Fermentation Company is plaintiff, and Magdalena Maus *et al.* are defendants.

The said HENRY JAMESON, M. D., first witness, being duly sworn to testify the truth, the whole truth, and nothing but the truth relating to said cause, deposes as follows:

Examined by H. W. HARRINGTON, Esq.:

Q. 1. What is your name, age, residence and occupation?

A. Henry Jameson; age is thirty-three, past; residence is Indianapolis, Indiana; occupation, a practicing physician.

Q. 2. Have you to any extent studied the subject—the pressure of carbonic acid gas generated by beer in the shavings cask, in the process of manufacture of beer, and the pressure of such gas, and the regulation and control of such pressure by automatic process?

A. I have made that more or less of a study—that is, I have read up the subject. I have made it a study more especially in connection with my study of physics and chemistry.

Q. 3. Will you state whether beer, in the process of manufacture and while in the shavings cask, generates carbonic acid gas, and what danger there is to the cask, if any, by such generation, and what necessity, if any there is, of regulating such pressure?

A. In the fermenting tub or shavings cask the beer undergoes fermentation. As the result of this fermentation carbonic acid gas is given off, and as a result, if confined in the cask, the pressure might become so great as to burst the cask; therefore the necessity of regulating this.

Q. 4. Will you state whether such regulation may be made by means of pipes inserted in the bungs of casks and controlled by any automatic appliance which will permit the excess of gas to escape and confine the residue in the cask?

A. It may.

Q. 5. Will you please look at the drawing accompanying the

patent, set out in the bill in this case, as issued to Meller and Hofmann, and describe the process of regulating the pressure and allowing the escape of carbonic acid gas as contained in such drawing?

A. In this drawing the capital A's represent the three shavings casks. Now, we have joined to the bung of each one, at *a a a*, a pipe passing upwards to a common pipe, *a'*. This pipe *a'* passes to a water column, represented by C; it taps this column at point *x*. The pipe *a'* also communicates with the generators *h h*, and also is connected with the pressure-gauge *e''*; there is also an outlet-pipe and cock, designated by *e* for outlet-pipe, and *e'* for outlet-cock.

Now, that describes the essential parts of the apparatus. The
54 beer is placed in casks A A A. After the apparatus is set up, as hereinbefore described, the apparatus may be tested by generation of carbonic acid gas in the generators *h h h*, or these generators may be used subsequently for the purpose of renewing or increasing the pressure at any time in the common pipe *a'* and in the casks A A A.

The beer is placed in casks A A A, and subjected to the proper temperature to produce fermentation. One of the products of this fermentation is gaseous in its nature and rises in the air-space above the beer in the casks; this air-space being in communication with the common pipe *a'* through the pipes N N N, it is free to pass throughout the length of the pipe *a'* so long as the pressure is greater in the cask than in any part of *a'*. Now, the amount of pressure in the pipe *a'* is represented exactly by the weight of the water in the column C, from the point of entrance in the pipe *a'* in the column to its upper surface. Every two feet of perpendicular measurement in the water column would represent about one pound of pressure to the square inch. Therefore, the amount of pressure in the common pipe *a'* and in the communicating pipes N N N, and upon the surface of the fermenting liquor in the casks may be increased or diminished at will by increasing or diminishing the height of the water in C.

Q. 6. You notice stop-cocks connected with the pipe connecting with the bung of each cask. Will you state whether those have anything to do with the process of regulating the automatic pressure?

A. They have nothing to do with the regulation of the pressure automatically. The stop-cock *i* would enable the brewer to shut off any individual cask from the system, and the stop-cock *i'* would enable him to close the communicating pipe N and retain the pressure in the rest of the apparatus.

Q. 7. Has the pressure-gauge anything to do with the process you have described?

A. It is simply an accessory piece of apparatus, and simply serves to indicate the pressure throughout the apparatus.

Q. 8. Will you state whether this automatic pressure, upon the same principle and process, might be any other fluid, spring, or adjustment, which would resist the pressure of the gas to the desired point, and at such point yield and allow it to escape?

A. Yes, sir; it might be. We might have, instead of the column of water C, for the purpose of balancing the pressure in the casks

and in the common pipe a', a column of any other liquid, such as mercury, salt-brine, acetic acid, sulphuric acid, or in fact any liquid substance that would be practicable, or the pressure might be counterbalanced by means of a spring, or any elastic substance with the requisite tension.

Q. 9. Will you state whether with such substituted apparatus or fluid as you have mentioned the process and principle would be any different from the process and principle in the patent you have described?

A. So far as the process and principle are concerned, the methods described would be in essence the same, the difference being simply one of mechanical detail or construction.

Q. 10. Will you please look at the patent and drawing now shown you, called the Wallace patent, issued March 5, 1867, and numbered 62581, and explain the process of controlling automatically the pressure of carbonic acid gas in casks such as you have described, during the process of manufacture?

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A. We have the shavings casks A A in this drawing, into which the fermenting beer is placed. Communicating with the tops of these casks we have the pipe E and E′ communicating between the casks and also the stop-cocks H and H′. Now, we have also the stop-cocks H and H′ communicating with the outlet-pipes G and G′, which pipes dip down into the column of water contained in the cask C. Now, as the pressure is generated in the casks A A by the evolution of carbonic acid gas, it is free to pass from one cask to the other in the series through the pipes E and E′, or should pressure at any time exceed the weight of the perpendicular columns of water in C, which is above the lower end of the outlet-pipes G and G′, it is free to escape through these pipes, thus regulating the pressure, making it at its maximum equal to the perpendicular weight of the water in C, which is above the lower end of the exit-pipes G and G′.

Q. 11. Will you please state wherein the principle and process wherein the patent in process set out in the bill and the patent you have just described differ each from the other, if at all?

A. So far as the principle and process are concerned there is no essential difference whatever, the only difference being in the mechanical construction of the apparatus.

Q. 12. Can the automatically controlled process of fermentation, as described in the patent set out in the bill, be carried out and perfected without infringing upon the process and principle of the said Wallace patent?

A. The principle and process are in essence the same in both forms of apparatus. I should say, therefore, that one would necessarily infringe upon the other.

Q. 13. Will you state whether in the principle and process it makes any difference whether the automatic pressure is applied to one or several tuns or casks?

A. It makes no difference whatever.

Q. 14. Are you familiar with the principles of automatic pressure in use in the manufacture of champagne wines, as described in

Muspratt's Chemistry—that is, with the description given in the work? If so, please state the date, as near as you can, of the publication, and whether it is a book in general use among chemical technologists.

A. I remember the fact that in Muspratt's Chemistry, under the head of the manufacture of champagne or sparkling wines, there is described processes for regulating the pressure in the vessel containing the fermenting liquor, automatically, and that it is my belief that the latest edition of Muspratt's Chemistry was issued more than fifteen years ago, and that this work was at that time the leading authority upon practical chemistry. It is still an authority, but has been somewhat displaced by more recent and exhaustive works.

Q. 15. Will you state whether you have had experience in chemical laboratories, and whether this principle of automatic pressure has been used, and how, and for what length of time in such laboratories?

A. I have been connected with some chemical laboratory since 1867. To my certain knowledge this principle of controlling gaseous pressure automatically has been in constant use among chemical manipulators and manufacturing chemists for various purposes, such as the controlling the pressure in gas tanks or holders, or in forms of apparatus for the filtration of liquids.

Q. 16. Will you state what substance or means were used to produce such automatic pressure in the chemical laboratories you have referred to?

56 A. Usually metallic mercury is employed; in some instances, however, water or glycerine or sulphuric acid.

Q. 17. Can you state whether in an old work on chemistry, known as Comstock's Chemistry, there was a design and description of the automatic pressure caused by water upon gas, and regulating the expansion of gas, and the date of such publication, if you can remember it?

A. There was such a work and in it a design describing such apparatus, and the edition of this work in which I remember to have seen the apparatus described was issued more than twenty-five years ago.

Q. 18. Please look at the drawing now shown you of what is called Hicks' patent, numbered 63636 and patented April 9, 1867, and please describe generally the process and principle of said design, and by what means the automatic pressure is produced.

A. In figure 2 we have a longitudinal section of the air-vent, in which *a'* represents the body of the plug; *c* represents an adjustable screw, which works in the upper end of the hollow plug *a* by a screw-thread; *d* represents a movable piece of metal, which is free to move up and down inside of a slot or opening in the side of the screw *c*, and within the body of the plug *a*. At the bottom of *d* we have a ground metallic conical valve resting in a valve-seat in the plug *a* at the point *g*. Now, this valve is held in position by a spiral spring which surrounds the metal core *d*, and is at the upper end of the same, just inside of the regulating-screw *c*; by means of the regulating-screw *c* the tension of the spiral spring may be increased or

diminished, thereby increasing the pressure of the conical valve at *g* upon its seat.

This piece of apparatus works in the following manner: The lower end of the plug, as represented in figure 1, is introduced or screwed into a suitable opening in the upper part of the fermenting cask and is ready for action. Now, the carbonic acid, or other gas, has free access to the valve *g*, through the opening at the bottom of the plug, and whenever the pressure becomes greater than the tension of the spiral spring in the upper part of the plug, the valve *g* is lifted from its seat and the gas allowed to escape at the aperture *i* in the side of the plug until the pressure becomes equal to or less than the tension of the spring, when the valve *g* is reseated and the gas ceases to escape.

Q. 19. Will you state what the principle and process of the apparatus you have just described, applied to casks of beer, would be, compared with the process in the patent set out in the bill?

A. The essential factors are the same in all of the processes described, the tension of the spring in this case representing the weight of the column of water in the two instances before described.

Q. 20. Will you look at the design or drawing representing what is called the William Gilham patent, numbered 115,950, patented June 13, 1871, and explain what, if any, automatic principle of automatic pressure is applied by that patent?

A. He has, in figure 1, regulated the pressure within the casks, automatically, by the safety-valve C; here he uses a lever and weight to counterbalance the internal pressure. Now, in figure 2, when there is an excess of pressure, the gas is allowed to escape at the safety-valve *c i;* but when the pressure is not excessive, but simply unequal in the inner and outer casks, it is regulated through the tube C G F and F′, and the equilibrium between the two casks thereby restored, a column of mercury acting as a valve and preventing the mixture of the air in the external cask with the
57 carbonic acid in the internal cask. In figure 3 it is designed to attach the same safety-valve to the branch of the three-way cock, which communicates with the carbonic acid in the upper part of the vat, allowing it to escape when the pressure has become greater than the weight of the safety-valve. The principle involved in this is essentially the same as that in those heretofore described, the difference being simply one of mechanical arrangement, in this instance the gas being retained by the weight and lever of safety-valve in lieu of a column of water, as described in the first two, and a spiral spring in the third.

Q. 21. Please look at the drawing of what is called the W. Dietrichsen patent for preserving beer, numbered 90349, patented May 25, 1869, now shown you, and state what principle or process is involved in the patent to regulate automatically the escape of carbonic acid gas from the beer in the barrel?

A. The principle in this piece of apparatus, in so far as the column of water represented by a column of water whose height would be equal to the distance between the surfaces of the water in A and A′, creating a pressure in the cask, is the same as in the apparatus

hereinbefore described in the patent in the bill. It differs in the fact, however, that it not only maintains the pressure equal to the aforesaid column of water, but in that it will supply pressure to the cask, as the pressure from the cask is released through some other opening.

Q. 22. Please look at the translation taken from page 357, section 24, of Part Fifth, of Vorschule der Bierbrauerei, now produced; also at the design or drawing at page 358 of the same book, and describe what principle or process of automatic pressure is applied and described to control the pressure and escape of carbonic acid gas in this book.

A. In this instance the internal pressure of the gas is controlled automatically by the tension or elasticity of a valve-like rubber strap being tied over an opening in the bung, the amount of pressure within the cask being increased or diminished as the tension upon the ends of the strap is increased or diminished. In this instance the force which counterbalances the pressure within the cask is the elasticity of the rubber. The rubber is the same factor in this apparatus as the water in the two first described, as the spring in the third, and the weight and lever in the fourth, and as the water in the fifth, all of the other factors in each form of apparatus remaining constant.

Q. 23. Will you state what difference, if any, in the automatic process or principle of controlling the action of carbonic acid gas, in the case you have just referred to, is different than the process or principle described or claimed in the patent in the bill?

A. The principle is the same in this form of apparatus as in that described in the bill. In this instance we have the tension of a rubber strap counterbalancing the pressure within the cask in lieu of a column of water, the only difference, therefore, being one of mechanical arrangement.

Q. 24. Will you state in the testimony and opinions you have given as to the apparatus and patents and process whether your testimony has reference to the process as applied to malt-fermenting beers?

A. It has.

Q. 25. Will you state whether what is called the generator in the Meller & Hofmann patent has anything to do with the automatic pressure and process you have referred to in your testimony?

A. It has nothing whatever to do with the regulation of the pressure in the casks, and may simply be regarded as an accessory, by means of which the pipes might be tested for leakage before the apparatus is put into use, or by means of which the pressure might be restored in case it should rapidly decrease from any cause.

58 Cross-examined by EPHRAIM BANNING, Esq.:

Q. 1. Have you ever testified as an expert in a patent cause, and are you accustomed to testify as an expert in matters involving questions of chemistry?

A. I do not remember to have testified in any patent case, but am

accustomed to testifying in cases involving questions of chemistry and physics.

Q. 2. Have you ever given special study to the question of fermentation, particularly as it relates to the manufacture of beer?

A. I have, in so far as it comes in a general course of study on chemical technology.

Q. 3. Are you familiar with the practical operation of the process of treating beer under an automatically controllable pressure of carbonic acid gas while in the shavings casks described in the complainant's patent now in suit; in other words, have you ever seen the apparatus described in such patent, or any other apparatus, applied to shavings casks for the purpose of automatically controlling the pressure of carbonic acid gas?

A. I have seen these forms of apparatus in use in breweries. I have seen the same principles applied in the laboratory to the different forms of apparatus, and while I have not made this form of apparatus a special study aside from the other departments in brewing and chemistry as applied to manufacture, I feel that I thoroughly comprehend the principle involved in all of the forms of apparatus described.

Q. 4. Have you made the process of treating beer described in complainant's patent a special study; if so, to what extent?

A. Aside from my regular study of chemical technology in the different text-books, Wagner, etc., I have read, in connection with this case, Lippincott's Practical Chemistry, in which the subject of brewing is exhaustively considered.

Q. 5. Have you read any German works on the subject of beer, and are you familiar with the different processes in use prior to the introduction of the Meller & Hofmann process in this country, say in 1877?

A. I have not read any German text-books. I have read translations and extracts from the German books, and think I am familiar with the processes prior to the period named.

Q. 6. What do you consider to be the essence of the Meller & Hofmann invention?

A. The Meller & Hofmann apparatus is, in essence, a form of apparatus by means of which the pressure produced by the evolution of carbonic acid gas may be maintained in one or a series of shavings casks at the same point; and this point being set at the will of the operator, and the apparatus thereafter maintaining this pressure constantly, automatically, without the interference of the operator. The apparatus is also designed to maintain an equal pressure in all of the casks in the series.

Q. 7. What do you understand the term "kraeusen stage" to mean, as used in complainant's patent?

A. The "kraeusen stage" is the fermenting stage, as I understand it.

Q. 8. Do you understand it to be limited to any particular time or stage of fermentation?

A. My understanding of the "kraeusen stage" is that it is while the beer is undergoing its first stage of fermentation.

Q. 9. Do you know whether the beer is in what may be called a wild or somewhat furious fermentation or in a mild fermentation when in the " kraeusen stage?"

59 A. My understanding is that the first fermentation is liable to be a violent fermentation, in which a great amount of carbonic acid gas is apt to be evolved.

Q. 10. Do you consider that there is any difference in principle between the application of this process to the purpose specified in complainant's patent and the charging of sparkling wines with carbonic acid gas as described in the Gilham patent?

A. If I remember rightly, in that Gilham patent he depends upon the evolution of gas from the liquor itself. In that event the principle involved is precisely the same.

Q. 11. Then the Gilham patent existing previously, you do not consider that there could be any special merit or novelty in the application of the particular process described in the complainant's patent to the particular purpose, in the particular manner, and at the particular stages specified?

A. In so far as the principle involved in both pieces of apparatus in question is concerned, they are in essence the same; the design in the Meller & Hofmann machine being to retain within the casks a certain uniform pressure of carbonic acid gas, to be redissolved by the beer, thereby giving it sparkle and life. This is accomplished in this instance by the weight of a perpendicular column of water. Now, in the Gilham apparatus the design is to retain within the fermenting cask the carbonic acid generated by the fermenting liquor at a given pressure, in order that it may be redissolved by the liquor, by a counterbalance, consisting of a weight and lever, acting automatically, instead of the column of water, as used in the Meller & Hofmann apparatus.

Q. 12. Which of the various exhibits now before you, and specifically referred to in direct examination, do you consider to most fully embody the principle and process of complainant's patent numbered 215,679?

(Objected to by respondent on ground — witness has testified that all exhibits contained the same principles and process. The question assumes that the witness, in his direct examination, has made a distinction between the various exhibits.)

A. Each one of the forms of apparatus examined embody the whole principle of controlling the pressure within the cask by a counterbalancing force which acts automatically.

Q. 13. As I understand, you do not consider that any special importance is to be attached to the fact that the Meller & Hofmann process is to be applied for a particular purpose and during a particular stage of the fermentation?

(Objected to by respondent on the ground that it is immaterial.)

A. In so far as the variation of the principles involved is concerned, I would say that there is no important difference between any of the processes.

Q. 14. Do you know exactly what effect the application of the Meller & Hofmann process to shavings casks has on the insoluble matter in the beer? Does it cause it to settle more rapidly than would otherwise be the case, or does it suspend it in the beer, or what effect does it have?

A. The Meller & Hofmann apparatus would not cause a more rapid subsidence of insoluble material in the beer, but by the more gradual escape of the excessive carbonic acid gas possibly there would not be so much likelihood of disturbing the sediment by sudden frothing of the beer by the rapid escape of an excess of carbonic acid, which might take place in some of the other forms of apparatus described.

60 Re-examined by H. W. HARRINGTON, Esq.:

Q. 1. In your last answer had you reference to the apparatus and not to the process involved by automatic pressure? In other words, would any automatic pressure applied in such a manner as to permit the escape of the surplus carbonic acid gas and retain what was proper in the cask have the same effect upon the insoluble matter in the beer?

A. I had reference merely to the mechanical construction of the exit-pipe in the Meller & Hofmann apparatus, which would probably release the surplus gas more gradually on account of the method of its construction. Any other mechanical device which would permit the surplus gas to flow out gradually would be attended with the same results.

HENRY JAMESON, *M. D.*

And the said JACOB W. LOEPER, second witness, being duly sworn to testify the truth, the whole truth, and nothing but the truth, relating to said cause, deposes as follows:

Examined by H. W. HARRINGTON, Esq.:

Q. 1. What is your name, age, residence, and occupation?

A. Jacob W. Loeper; my residence is Indianapolis, Indiana; age, thirty-nine; occupation, mechanical draftsman.

Q. 2. Have you compared a translation you hold in your hand from Vorschule der Bierbrauerie, pages 357 and 358? Will you state whether you have compared the translation with the original on the pages referred to?

A. Yes, sir; I have compared them and find it to be substantially correct, and I make the translation an exhibit.

Q. 3. Where and with whom were you engaged in the year 1867?

A. At Indianapolis, Indiana, with E. F. Steffens, at his mathematical instrument shop, at Hubbard's block, corner of Washington and Meridian streets.

Q. 4. If, while so employed in the year 1867, there was manufactured at said shop any plug or bung for controlling the pressure of gas within a cask or other enclosed vessel, you will please so state and give as full and accurate description thereof as you may be able.

A. Yes, we manufactured a wooden bung, and also the brass vent to insert in the same. The wooden bung was bored out to suit the

size of the brass vent. The brass vent consisted of a stem bored out large enough for the gas to escape; at the top of this stem a rubber strap was fastened in such a manner as to act as a valve. A cap, covering and screwed onto the stem, with two small openings on the top, allowed the gas to escape out of the same.

Q. 5. You will please state how the rubber strap was fastened at the top of the vent so as to act or operate as a valve?

A. There was a groove around the valve-stem; then the rubber fastened across by means of twine, leaving room on the side for the gases to escape.

Q. 6. How was this bung intended or calculated to be used?

A. The wooden bung was driven into the cask first; into the hole of the bung the vent was screwed.

Q. 7. What was the measure of the pressure of carbonic acid gas which such an apparatus would confine within the cask and how did it operate?

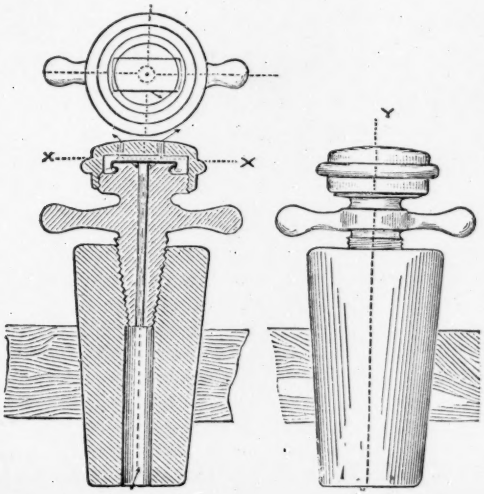
A. The pressure of the gases raised the rubber according to the tightening of the rubber band. It operated itself after it was fastened once.

61 Q. 8. After the bung was inserted in the cask with the rubber strap drawn to that point of tension where it would measure the amount of pressure desired to be retained within the cask, what, if any further, attention would be required in its operation?

A. None.

Q. 9. Will you please draw a sketch of the apparatus you have above described as applied to a cask, showing the bung, the vent, the band, and the cap, and furnish it to the examiner, to be attached to and made a part of your deposition?

A. I will, and the following is a sketch of it:



Q. 10. For whom was this bung made?

A. August Beiser, foreman at Gegg & Co.'s brewery, Indianapolis, Ind.

Q. 11. Have you ever seen this bung in actual use at the brewery?

A. No; I have not seen it myself.

Q. 12. For what purpose was the bung constructed, if you know?

A. For retaining gases in casks or kegs while in a process of fermentation.

Cross-examined by EPHRAIM BANNING, Esq.:

Q. 1. In your last answer you say the bung you have described was to be used for retaining gases in casks or kegs, etc.; do you know, of your own knowledge, at what particular time or stage it was to be applied?

A. No; I don't know of my own knowledge. It was ordered and made to be used when the gases were escaping after the kraeusen were admitted.

(Counsel for complainant objects to all of the latter part of answer as not responsive to the question.)

Q. 2. Do you know whether it was to be applied the same as the apparatus described in Vorschule der Bierbrauerei, a cut of which appears on page 358?

A. Yes, sir; it was the same.

JACOB W. LOEPER.

And the said FRANK A. MAUS, third witness, being duly sworn to testify the truth, the whole truth, and nothing but the truth, relating to said cause, deposes as follows:

Examined by H. W. HARRINGTON, Esq.:

Q. 1. Name, age, residence, and occupation, and are you one of the defendants in this case?

A. Frank A. Maus; age, thirty-one; Indianapolis, Indiana; one of the managers of C. Maus' brewery; I am one of the defendants in this case.

62 Q. 2. Will you state whether you are working in the brewery named in the bill, and having charge of the same before and at the time this suit was commenced?

A. I was working at the brewery named at the time and a number of years previous to the commencement of this suit, and am still employed there.

Q. 3. Do you recollect before this suit of a man by the name of Otto Zwietusch, calling at the brewery, having a conversation with you in reference to the Meller and Hofmann patent? If yea, please state what was said by him and by you on that occasion.

A. I recollect Mr. Zwietusch calling at the brewery a few months previous to the bringing of this suit. He represented himself as agent or superintendent of the New Process Fermentation Company. He offered to sell us their apparatus to be used in our brewery. I told him that we did not need the apparatus. He asked then if

we had any apparatus in use for controlling fermentation of beer. I told him we had one that was modeled after an apparatus used by my brother at Nashville, Tennessee, in 1877, in his brewery. He asked how it was constructed. I told him that it consisted of a body of water in a stand-pipe, connected at the base by rubber hose which was connected with the top of the casks. He claimed that that was an infringement on their patent. I told him that that could not be the case, because my brother applied for a patent on his apparatus long before they obtained theirs, and that his application was rejected because it was anticipated by prior patents. Mr. Zwietusch further said that he did not care what apparatus we used; that they claimed a patent on the process; that if we wanted to use our apparatus we had to obtain license from their company to carry out the process on which they claimed a patent; that he didn't care what kind of apparatus we used, whether it was water column or mechanical, he still considered it an infringement on their patent. I cited a number of patents on apparatus granted many years before their patent was, which carries out the process which he claims to have patented. He offered to make a reduction on the regular price if we would take a license from their company and use our apparatus. We declined to take a license from him.

Q. 4. Will you state and describe what apparatus you were using at that time, and at the time of the commencement of this suit, in your brewery described in the bill?

A. The apparatus used was constructed as follows: Starting at the bung-hole of the cask, we inserted a spigot at the bung hole and attached a rubber hose to the spigot. That hose led to the top of a small cylinder, which it entered. A small pipe was also attached to the top of the cylinder, which was connected at the other end to the base of a water column. In some cases this little pipe led down the center of the water column, through the water, and so allowed the gas to escape through the water. The rubber hose connected the casks separately to the column of water, and the pressure of one cask would not affect the pressure in the other.

Q. 5. If you said anything further to the person named in your previous answer with reference to what patents had been obtained on the apparatus to carry out the process, you may state what patents you named to him, and also what you said, if anything, to him about his company's patent on the apparatus they used. By company, I should have said Meller & Hofmann.

A. I cited the Hicks patent bung as carrying out their process; also the patent of Wallace, of Cincinnati, Ohio; and that their process was used in making champagne, and that I had seen
63 a bung described in an old publication which would carry out the same process. I mentioned this to him; that Bartholomae's application for a patent was on the apparatus on connecting a series of casks, and afterwards they obtained the patent on the process.

Q. 6. Will you give a description of a patent applied for by your brother, Clement A. Maus, and also the date, as near as you can,

when the process was used by your brother, at Nashville, Tennessee?

A. The apparatus consisted of a column of water connected to the cask by a single pipe. He did not have a cylinder in the line of the pipe. The pipe was connected with the cask at the bung-hole. It was in the year 1877 that he used it, but I cannot say what part of the year. I saw the drawings of his application for a patent, with the letter from the Commissioner declining a patent. He afterwards filed a new application.

Q. 7. Please look at the letters you hold now in your hand, and give the numbers and the dates of each, and by whom sent, and to whom, and also to which application of your brother Clement those letters refer?

A. I think they refer to the first application. The dates of these letters are July 30 and July 31, 1878. That of July 30 is numbered 8, and the one of July 31 is numbered 100. These letters were sent by the Commissioner of Patents to my brother. I make them exhibits.

Q. Were you present yesterday when a German book was presented to Dr. Jameson, with a translation of a portion of the same, relating to the automatic pressure to regulate the tension and escape of carbonic acid gas from beer in a cask? If so, state whether the same book is now here present as an exhibit, and what you know as to whether the translation is correct, and whether you read and speak German.

A. I was present when the book was handed to Dr. Jameson, and recognize the book to be the same shown him. I have seen the translation, and the translation is substantially correct. I read and speak German.

Q. 9. Will you state whether your father during his life was the proprietor of a brewery, and also state where this book you have referred to came from, if you know, and how far back you have known the book, and where it was when you first saw it?

A. My father owned and conducted a brewery from the year 1864 to the time of his death, in 1876. He brought the book named home, some time in 1866. I heard it was bought at Cincinnati, Ohio. It has been in the possession of the family ever since.

Q. 10. Do you understand practically the art and science of brewing?

A. I do. I have worked in all the departments of brewing.

Q. 11. Will you state in a general way the process of brewing, commencing with the time when the wort is drawn off into the kettle, and from thence on, to and including the shavings casks?

A. The fluid drawn from the mash-tun, when drawn off is called wort; is placed in the kettle and boiled from one-half to two hours, according to the brewer's notion; then hops are added, and boiling continues from a half hour to an hour and a half; then the wort is
64 withdrawn from the kettle, and is cooled to the required temperature and placed in large vats, called fermenting vats, which are open at the top. Then yeast is added. It is permitted to stand from ten to twenty days. The fermentation during the first few days is called

the "kraeusen stage." When the beer is withdrawn from the vats it is usually placed in large casks, for the purpose of letting it rest and become aged. It remains in those casks in a dead state, free from fermentation, from two weeks to six or eight months, and is known as ruh or lager beer. When needed for the market, the ruh beer is placed into shavings casks. The shavings casks are large casks, and contain shavings made of beech wood. Then a small per cent. of beer taken while in the kreausen stage is added, which causes the beer in the shavings casks to ferment in a mild form. The cask is then attached to our apparatus. The beer will clarify and charge itself with sufficient carbonic acid gas in from eight to fifteen days, when it is drawn into kegs and delivered to customers.

Q. 12. Will you now state whether there is any occasion to use the process of automatic pressure to retain the carbonic acid gas in the beer, and to permit any surplus to escape except at the time when the fermentation is progressing in the shavings casks?

A. By the usual mode of making beer there is no apparatus applied for controlling the carbonic acid gas, although it could be applied to beer in every stage of its manufacture, after fermentation has commenced.

Q. 13. Will you state whether brewers for more than twenty years past have used some means to control the pressure and escape of carbonic acid gas from the shavings casks during fermentation?

A. In Vorschule der Bierbrauerei, which was published about 1863, a bung is described which successfully controls the escape of carbonic acid gas when in the shavings casks. The vent-bung is described on pages 357 and 358 of said book. In 1874 or 1875 Mr. Wallace offered his apparatus to be put in our brewery to be used for automatically controlling fermentation of beer while in the shavings casks. Mr. Wallace's patent is dated March 5, 1867. Hicks' patent vent-bung was patented in April, 1867, which was also used to control automatically the fermentation of beer in casks. The Dietrichsen apparatus, patented May 25, 1869, can also be used to control automatically the escape of carbonic acid gas during fermentation of beer in casks.

Q. 14. Have you examined the Meller & Hofmann patent referred to in the bill? If so, will you state whether the principle and process of retaining carbonic acid gas in the manufacture of beer in the shavings casks is different or the same principle and process applied and used by your brother Clement, at Nashville, Tenn., and applied and used in the Wallace patent, and the other patents you have referred to and described as used in the book publication you have referred to?

A. I have examined the Meller & Hofmann patent, and find the principle and process are the same as carried out by the apparatus used by Clement A. Maus, and by George Wallace's apparatus, and others named. The process was established by the use of either of the apparatuses used.

Q. 15. Will you state whether there is anything new or novel, as set out or contained in the Meller & Hofmann patent, in the

process and principle of regulating and controlling the pressure automatically of carbonic acid gas in the process or work of manufacturing fermenting beer—that is, any process or principle that was not known, described, and used before?

A. I can see nothing new nor novel in the Meller & Hof-
65 mann patent, after seeing the apparatus above named, the process and principle claimed in the Meller & Hofmann patent having been carried out by the other apparatuses.

Q. 16. Does it make any difference in the principle and process whether the automatic pressure is produced by a water column, a column of any other fluid, an elastic substance like india-rubber, or a weight properly adjusted, or a spiral spring?

A. It makes no difference in the principle or process how the automatic pressure is supplied.

Q. 17. You have spoken in your examination of a cylinder used in your brewery to which the rubber pipe or hose is connected; has the cylinder anything to do with the principle and process of automatic pressure?

A. The cylinder is used for the purpose of receiving foam or condensable gases that rise into the rubber tube. It does not affect the principle or process in the least.

Q. 18. Will you state whether at or before the time of the commencement of this suit the respondents were using or had used the apparatus described in the Meller & Hofmann patent?

A. The respondents at no time used the apparatus described in their patent?

Q. 19. Will you state whether the patent of Mr. Wallace, referred to by you, covers the process and principle of automatic pressure applied to carbonic acid gas in the fermenting vats, as well as in the shavings casks?

A. It would.

Q. 20. Will you state whether the generator involves any part of the process and principle of automatic pressure which retains and permits the escape of surplus carbonic acid gas?

A. The generators have nothing to do with regulating the escape of carbonic acid gas.

Q. 21. You may state whether, in your brewery described in the bill herein, the respondents at any time made use of the generator?

A. They have not.

Cross-examined by EPHRAIM BANNING, Esq.:

Q. 1. The patent to George Wallace, of date March 5, 1867, numbered 62581, is now owned by the Wallace Improved Fermentation Company, of this city, is it not?

A. Yes, sir; it is.

Q. 2. Are you interested in the Wallace Company last named, or are any of the defendants interested in it, so far as you know?

A. Yes, sir; myself and two of the other defendants are interested in it.

Q. 3. When was that company organized, and for what purpose?

(Respondents object to part of question asking for what purpose the Wallace Company was organized, on the ground that it was irrelevant so far as the purpose is concerned.)

A. The company was organized last summer some time, for the purpose of manufacturing and selling apparatus patented by George Wallace.

Q. 4. If you have a circular of the Wallace Company present, will you have the kindness to produce it and allow it to be made a part of your deposition?

A. I have, and make the same an exhibit.

Q. 5. How long have you been using the apparatus described in your direct examination, on shavings casks?

A. It was either in the fall of 1878 or spring of 1879 that we commenced. We did not use it on any kind of casks before that.

66 Q. 6. How soon after the beer is drawn into the shavings casks and the kraeusen and finings put in do you apply this apparatus, and how long do you keep it on the casks for the purpose of controlling the pressure of the carbonic acid gas?

A. As soon as the kraeusen and finings are added to the ruh beer in the shavings casks we attach the apparatus. Sometimes, however, it is not attached until a day or two after they are added, and we keep it attached from eight to twenty days, till the beer is drawn off for the market.

Q. 7. On an average do you succeed in getting the beer ready for market more quickly when this apparatus is used than you were able to do before you commenced using it?

A. On an average there would be a gain of about two days by the use of the apparatus.

Q. 8. Are you not also able, by the use of your apparatus, to keep the beer from running out of the bung-hole with the foam or froth, and thus rendering the cellars foul and impure?

A. When the apparatus is attached to a cask that is full, foam and yeast are carried through the tube into the cylinder, from which it is afterwards withdrawn, and prevents the yeast from running over. If the cylinder were not used it would require that the casks be not filled up to within a few inches of the bung.

Q. 9. Before bunging apparatuses came into use for the purpose mentioned in complainant's patent, was it not a common and troublesome experience that the pressure of the gas would cause the foam and yeast, and also considerable beer, to overflow through the bung-hole, and thus to render the cellars foul and impure?

A. Where no apparatus was used the form and yeast escaped through the bung-hole.

Q. 10. Did you ever see that vent-bung, described in the book referred to, in use?

A. I have not seen it in use, but it has been used in our brewery—last year some time.

Q. 11. The apparatus used in your brewery accelerates the clarifying of the beer, does it not?

A. Yes, sir; it does accelerate it somewhat.

Q. 12. Are the casks connected together by the apparatus you are using now?

A. Each cask is connected separately to the cylinder, and the gas from each escapes into the cylinder, and the gas is carried thence into the water column, said column determining the pressure. The apparatus now used by us is the same as that shown in the circular of the Wallace Improved Fermentation Company, and has been in use in our brewery about a year. Without the cylinder the yeast and foam would be carried into the water column and necessitate frequent change.

Q. 13. In your answer to question 13, direct examination, you say, among other things, that in 1874 or 1875 Mr. Wallace offered his apparatus to be put in your brewery to be used for automatically controlling fermentation of beer while in shavings casks. Do you remember whether Mr. Wallace said anything about "shavings casks," and did you have any conversation with him personally at that time?

A. I had a conversation personally with him, and he said he had a patent on apparatus for the purpose of controlling fermentation, and I don't remember his using the words "shavings casks."

Q. 14. Do you remember whether he spoke of controlling the pressure of any particular stage of the fermentation or in any particular kind of casks?

A. There was nothing said of any particular kind of casks, or of controlling the pressure at any particular stage.

67 Q. 15. Do you remember what special advantages he claimed for his invention at that time?

(Objected to by respondents as irrelevant and immaterial.)

A. He claimed that it was a great improvement, and would improve the quality of the beer by regulating the fermentation.

Q. 16. To whom else did he speak at your brewery, or who were present when he talked with you at the time mentioned?

A. I don't remember of any one being present. I do not know whether he spoke to any one else about it.

Q. 17. Did you talk to your father or brothers about the Wallace invention after his conversation with you about it?

A. I don't remember whether I mentioned it to any one at the brewery or to any of the parties.

Q. 18. Why did you not talk with them about it?

A. I did not attach enough importance to it at that time.

Q. 19. Do you consider that the Hicks patent describes the Meller & Hofmann process?

A. I don't see how it can describe it. The Hicks patent doesn't claim to have invented a new process of treating beer, but it fully carries out the process claimed by Meller & Hofmann's patent.

Q. 20. Does the Wallace patent describe the Meller & Hofmann process?

A. It describes the mode of regulating pressure during fermentation in a similar way as is done in the Meller & Hofmann patent, but it does not speak of a new process.

Q. 21. Does not the term "kraeusen stage" apply to the fermentation in the shavings casks after the kraeusen and finings are added?

A. The "kraeusen stage" during fermentation is while the young beer is in a suitable condition to be used in the shavings casks for starting fermentation in a mild way there, and ceases as soon as the fermentation begins to recede in the fermenting vats.

Q. 22. The description on pages 357 and 358 of Vorschule der Bierbrauerie directly states the purpose for which such apparatus as there described was intended to be used, does it not?

A. Yes, sir; it describes what it was to be used for.

Q. 23. And, so far as you know, the invention there described makes as near an approach to the Meller & Hofmann invention as anything existing previous to, say 1877? Is not this the fact?

A. It is the earliest description of an apparatus that carries out the process of Meller & Hofmann's patent, though it does not do the work as thoroughly as Wallace's apparatus does, which is also prior to 1877.

Q. 24. You do not consider that the Dietrichsen patent of May 25, 1869, has any real bearing on this case, do you?

A. Well, it will do to carry out the process.

Q. 25. Does it describe, or even mention, the Meller & Hofmann process?

A. No, sir; I believe not.

Q. 26. In your answer to question 18, direct examination, you say that the defendants have not used the Meller & Hofmann apparatus; by this you mean that they have not used the specific form of apparatus shown in the drawings, do you not?

68 A. Yes, sir; that is my understanding.

Q. 27. What do you consider to be the essence of the Meller & Hofmann invention?

A. The use of a column of water to regulate fermentation I consider the essence of the invention.

Re-examination by H. W. HARRINGTON, Esq.:

Q. 1. Would not any apparatus which controls automatically the pressure of carbonic acid gas generated by beer in casks, applied to the bung of casks, prevent the froth and yeast from running out of the bung as well as the Meller & Hofmann apparatus of automatic pressure?

A. No apparatus will prevent beer from running out at the bung unless an air-space is left between the top of the beer in the cask and the bung-hole.

Q. 2. Will you state whether in the Meller & Hofmann patent there is any cylinder attached to the apparatus?

A. There is no cylinder attached to the Meller & Hofmann apparatus.

Q. 3. What, then, will become of the yeast and foam, if any, that rises from the beer in the cask in that apparatus?

A. The yeast and foam that rise during fermentation in the cask into the bung-hole are carried into the column of water, excepting

that which may flow into other casks connected to each other by the main pipe if not withdrawn by the outlet.

Q. 4. When Mr. Wallace talked with you in reference to his patent did he not claim that it would apply in the manufacture of beer wherever an automatic pressure was needed to control the quantity and escape of carbonic acid gas?

A. I do not remember the exact words he used, but he claimed that it would afford many advantages wherever it was used in the brewery.

Q. 5. If you do not recollect his words can you state whether he explained to you the principle and operation and results from the use of his patent?

A. I was quite busy at the time, and we did not go into the details of his invention.

Q. 6. Will you state whether the apparatus patented by Mr. Wallace can be applied and used to shavings casks for beer without suggesting and calling to the attention at once the process and principle claimed in the Meller & Hofmann patent?

A. No, sir; it cannot.

Q. 7. I will ask you whether the Wallace patent does not describe as one of its objects and one of its results to relieve tanks of beer by allowing the surplus gases to escape into a vat or tub containing water, and yet retaining any alcoholic gases that may arise, and also to insure an equal fermentation in each tank?

A. Yes, sir; those are claims described in the Wallace patent.

Q. 8. I will also ask you whether the patent does not specify to allow non-condensing gases to escape, and also to prevent the atmosphere from getting into the casks or tanks?

A. Yes, sir; that is one of the claims of the Wallace patent.

Q. 9. I will ask you if the essence of the Meller & Hofmann patent is not the application of automatic pressure during fermentation to control the pressure of carbonic acid gas generated, permitting the surplus gas to escape through the water column, and if the residue is not a mere result from the automatic application?

A. The use of the water column, which furnishes the automatic pressure, develops the process claimed by the Meller & Hofmann patent, and I consider the water column to be the essence of their invention.

69 Q. 10. Will you state whether you introduced your clarifying gelatine into the shavings casks before or after the beer is introduced?

A. After the beer is introduced.

Q. 11. How long since you have been accustomed to introducing the gelatine after the beer has been introduced?

A. Since I have been connected with the brewery—about twelve years.

FRANK A. MAUS.

The said GEORGE WALLACE, fourth witness, being duly sworn to testify the truth, the whole truth, and nothing but the truth, relating to said cause, deposes as follows:

Examined by H. W. HARRINGTON, Esq.:

Q. 1. What is your name, age, residence, and occupation?

A. My name is George Wallace; fifty-eight years, to-day; Indianapolis, Ind.; I am a distiller by business.

Q. 2. Are you the Wallace described in the patent numbered 62581?

A. Yes, sir.

Q. 3. Will you state what date you made the discovery and use of apparatus for controlling the pressure of carbonic acid gas as generated in the process of manufacturing beer, described in your patent?

A. It was about the year 1866 that I brought it to maturity.

Q. 4. Will you describe your patent, its application, and the process which its application necessarily brings about?

(Objected to by complainant as immaterial and incompetent on the ground that the patent speaks for itself.)

A. I first take air-tight vessels; connect them with the necessary pipes, carrying them to a water column, these pipes regulating the flow of the gas from the generating tubs, or air-tight vessels. This water column regulates the flow of gas by automatic pressure.

Q. 5. Have you examined the patent of Meller & Hofmann referred to in the bill?

A. Yes; the principle is the same as my apparatus.

Q. 6. Suppose your apparatus is applied to casks containing beer in a fermenting stage and generating carbonic acid gas, I will ask you whether the process brought about by the application would be the same or different from Meller & Hofmann's claimed invention or process?

A. The application of my apparatus will effect the same results as Meller & Hofmann's patent claims.

Q. 7. Will you state whether in principle and substance the apparatus of Meller & Hofmann is the same or different from your apparatus?

A. The apparatus is the same principle exactly as the Meller & Hofmann patent.

Q. 8. You may state when you made your patent public in the United States or elsewhere.

A. I made it public in 1867, in Cincinnati, State of Ohio, and Kentucky and Indiana. It was in 1867 that I first made public and put it in practical operation, both in Ohio and Kentucky.

Cross-examined by E. BANNING, Esq.:

Q. 1. Did you ever put your invention into actual use?

A. Yes, sir.

Q. 2. Where, when, and on what kind of casks?

A. In the city of Cincinnati, in 1867, on whisky fermenting tubs in a distillery, the White Mills distillery, David R. Bradford.

Q. 3. Did you ever put it into use at any other time or place, or on any other kind of casks?

70 A. I put it in use at Boyd Station, on the Central railroad, Kentucky, in 1867 or 1868, on similar casks, whisky fermenting tubs in Reynolds' distillery.

Q. 4. Are these the only instances in which you ever put it into actual use?

A. No, sir; I put it in actual use in Maysville, Ky., from 1868 to 1871, in Pogue, Duke & Co.'s distillery, on similar casks. Those are all that I put it in practical use myself.

Q. 5. Have you ever used it for any purpose connected with the manufacture of beer?

A. No, sir; I have never used it personally for beer. I have seen it used in Maus' brewery in the form shown in the circular of the Wallace Improved Fermentation Company, which circular has already been made an exhibit.

Q. 6. In your answer to question 6, direct examination, you say that the application of your apparatus will effect the same results as the Meller & Hofmann patent claims. When did you first discover this fact?

A. I first discovered it by examining this apparatus of Meller & Hofmann's in 1881.

Q. 7. You never knew of it or thought of it before that time, did you?

A. I knew it would accomplish this object before I got out the patent.

Q. 8. You knew it would accomplish what object before you got out the patent?

A. It would hold automatic pressure of ale, wine, or beer, or any other liquor that would produce fermentation.

Q. 9. Before obtaining your patent were you engaged in a distillery?

A. Yes, sir; I was engaged in Mill Creek distillery from 1849 till 1854, and in the Buckeye distillery from that up to 1857. I was up in Poindexter's distillery, at Cynthiana, I think, just after the war. I was in a distillery at Evansville, Ind., for a few months after leaving the Buckeye distillery in 1857. I was working in distilleries, off and on, from 1849 to about 1859, when the war commenced. Again after the war till about 1871. At the time I got this patent, and for a few months previous, I had been working in Pike's distillery, Cincinnati, Ohio. I think that I first thought of this patent while at Cynthiana, in about 1866.

Q. 10. What particular work were you doing in these several distilleries?

A. I was a distiller, and superintended the making of the mash and yeast in the distilleries.

Q. 11. Have you ever worked in a brewery or been in any way familiar with the brewery business?

A. I never worked in a brewery, but I have been around them a good deal.

Re-examination by H. W. HARRINGTON, Esq.:

Q. 1. State whether you offered your invention publicly to brew-

ers in Ohio, Indiana, or any other State, to be applied for the automatic control of pressure of carbonic acid gas to casks containing fermenting beer generating such gas; if so, when and how many?

A. Yes; I showed it to some of the brewers in Cincinnati and brewers in Kentucky and Indiana. I offered it to a good many in Cincinnati, and I offered it in Maysville, Ky., and, I think, in Covington, Ky., and to Schmidt, in Indianapolis. In Cincinnati in 1867, and at Maysville from 1868 to 1870, and about 1874 or 1875 to Maus'; to Schmidt's about 1873 or 1874, at Indianapolis.

Q. 2. When did you first see what is called the Meller and Hofmann patent that is in controversy?

A. It was in 1881.

Q. 3. If, in the process of manufacturing whisky, a fermen-
71 tation takes place generating carbonic acid gas, as well as alcohol, and if it is necessary in accomplishing the proper manufacture of whisky to control automatically the pressure of the gas and permit the surplus to escape and exclude the air from the fermenting liquor, please state.

A. Yes, it is very necessary to exclude the air from the fermentation. It is necessary to control the gas automatically, as it produces a finer article of whisky from this process.

Q. Will you state whether there is any difference in principle and essence in controlling automatically the pressure of such gas in the manufacture of whisky than in the manufacture of beer, generating such gas?

(Objected to by complainant on the ground that the witness is not shown to be competent to testify as an expert.)

A. I think there isn't any difference in the principle of the two, as they will both make a superior article from the fermentation controlled automatically.

Recross-examination by Mr. BANNING:

Q. 1. In offering your invention to brewers, as you say you did, what did you represent or claim to them that it was capable of doing—that is, what benefits did you tell them would accrue from its use in the manufacture of beer?

A. I told them that by excluding beer from the atmosphere and holding the pressure automatically it would make a superior article and be more effervescing.

Q. 2. Did you tell them it could be used at any particular stage of fermentation or on any particular kind of casks?

A. I think I told them that it could be used in any kind of casks. I don't know as I recollect of mentioning any particular stage of the fermentation.

Redirect examination by Mr. HARRINGTON:

Q. 1. Will you state whether your apparatus would apply to any process in the manufacture of beer from the time of the first fermentation to the last?

A. My apparatus will apply to any kind of fermentation, from the first to the last stage of fermentation.

GEORGE WALLACE.

And the said MATHIAS A. MAUS, fifth witness, being duly sworn to testify the truth, the whole truth, and nothing but the truth relating to said cause, deposes as follows:

Examined by H. W. HARKINGTON, Esq.:

Q. 1. What is your name, age, residence, and occupation?

A. Mathias A. Maus; twenty-eight; Indianapolis, Indiana; foreman of C. Maus' brewery.

Q. 2. State whether you understand the art, practically, of brewing malt beer, and how long you have been engaged in the business of brewing.

A. I understand the art of brewing practically, and have been engaged in the same for the past fourteen years.

Q. 3. Are you one of the defendants in this action?

A. Yes, sir.

Q. 4. State what apparatus was used in the brewery referred to in the bill herein, before and at the time of the commencement of this action, with reference to controlling automatically the pressure and escape of carbonic acid gas.

A. The apparatus we used was the same as the one used by my brother, Clement A. Maus, at Nashville, Tenn., in his brewery. The same consisted of a column of water connected at the base with a small pipe and those running to the top of the cask connected to the bung. Each cask was connected separately with the water column at that time.

72 Q. 5. Will you state how the apparatus connected with the water column acts in controlling the pressure of carbonic acid gas in the casks, and permitting the escape of the surplus gas, if it does so?

A. After the apparatus is connected with the cask filled with beer, and the pressure of the carbonic acid gas generated by the same becomes greater than the weight of the water in the column, it forces the water out of the small hose connected with the column, and allows the surplus gas to escape through the same.

Q. 6. State whether the water column acts as an automatic pressure and control in regulating the pressure and escape of gas in casks.

A. Yes, sir; it does.

Q. 7. To what cask do you apply the apparatus, and to what part of the cask?

A. To the shavings cask, at the bung-hole on the top.

Q. 8. When the fluid is put into the kettle for the purpose of boiling and boiled, what is the fluid called at that stage of manufacture?

A. It is called the "wort."

Q. 9. Please describe the process from the wort-kettle until the

beer is stored in the shavings casks and the different terms applied to the various stages.

A. After it leaves the kettle it is cooled and placed into the fermenting vats. Then yeast is added, and the fermentation taking place in the following three to six days is called the "kraeusen stage." After it is through fermenting in the vat it is placed in the casks in the cellar, and is then called "ruh beer." It remains there from two weeks to six months. It is then drawn into the shavings casks and a certain per cent. of kraeusen added to it, which causes a second fermentation to take place. Finings are then added, sometimes when the beer is first put into the shavings casks, sometimes a day or two afterwards.

Q. 10. Will you state whether the term "kraeusen stage" applies to beer in the shavings casks properly or not?

A. I have never heard the term "kraeusen stage" applied to the beer in the shavings casks.

Q. 11. What is the condition of the "ruh beer" when put into the shavings casks, before a small quantity of kraeusen beer is added, as to life or fermentation?

A. It has no fermentation in the ruh casks, and very little life.

Q. 12. What per cent. of kraeusen do you put into the shavings casks to start fermentation?

A. Well, from fifteen to twenty-five per cent.

Q. 13. Will you state what effect the exclusion of air and the confining of carbonic acid gas in the shavings casks has upon beer?

A. The exclusion of the air which will necessarily follow in confining the carbonic acid gas and the retaining of the carbonic acid gas makes the beer effervescing and more palatable, on account of the gas being redissolved by the beer.

Q. 14. Will you state what difference, if any, there would be in essence and principle between any automatic pressure by spiral wires, adjusted weight, elastic appliance, like rubber or water column, in confining carbonic acid gas in the cask and permitting any surplus to escape at a given point of pressure?

A. I have tried different kinds, and find no difference in essence or principle.

Q. 15. What year did your brother Clement use the apparatus of automatic pressure you have referred to?

A. I think it was in the spring of 1878. I am not quite positive about that.

73 Q. 16. Have you examined the patent named in the bill in this suit, of Meller & Hofmann, and have you also examined the exhibit, the Hicks patent; also the exhibit, the Wallace patent; also the drawing and description in the exhibit, the German book referred to by the witness, Frank A. Maus, and the translation of it made an exhibit; if so, will you state what difference in essence and principle in the process caused by automatic pressure there is in these different patents and descriptions?

A. I have examined the patent mentioned in the bill; also the different exhibits mentioned above, and find no difference in essence and principle.

Q. 17. Will you state at what time, according to your recollection, your father purchased and brought home the German book Vorschule der Bierbrauerei, made an exhibit here, and to which you have referred?

A. It was not later than 1866.

Q. 18. Is your father living or dead, and will you state where he purchased the book you refer to?

A. My father died in 1876. He stated that the book was purchased by him through Herman Goepper, of Cincinnati, Ohio.

Q. 19. What business was Herman Goepper in at the time in Cincinnati, Ohio?

A. He was a hop merchant and dealer in brewers' supplies.

Q. 20. Do you know whether any of your family consulted and used the above-named book in brewing malt beer; if so, who, and at what date?

A. My brother, Clement A. Maus, used and consulted this book about 1877 or 1878.

Q. 21. At page 308 of the above-named German book, will you state what the author describes as the "kraeusen stage," and will you make a translation of what is there said?

A. In answer to your question I make the following translation from pages 308 and 309 of "Vorschule der Bierbrauerei," which contains the author's description of the "kraeusen stage:"

"Hop resin will also be driven to the surface, and lends the foam a very bitter flavor and a certain adhesiveness; through the rising or propulsion thereof the foam assumes a curly (gekräuseltes) appearance, and is called 'kraüsen.' Such foam at first is white in color (on account of the great distribution of the resin). Through the receding of the foam the particles of resin come into closer contact with each other, and give it a yellowish or brown color.

"The more hop resin is contained in the wort the sooner will the formation of kraüsen set in. By the increase of the carbonic acid development the expulsion of the resin is also increased, and the 'kraüsen' become higher and higher, and at last become pointed—that is, start upwards in sharp points. This gradual swelling or development of the kraüsen, the brewer names as follows: 'The kraüsen come;' 'the kraüsen are going on;' 'the kraüsen are standing.' The last is their highest stage, where the foam assumes, on account of its falling back, the pointed shape.

"In small beer fermentation the expulsion of the hop resin to the surface of the beer requires it to be removed before the yeast makes its appearance, otherwise it would impart a bitter flavor to the yeast.

"In lager beer fermentation, however, the kraüsen are left wholly to their own fate; they fall back into the beer, and the hop resin remains floating in brown masses on the surface of the beer, which now begins to clarify."

The fermentation above described is in open vats, commonly called fermenting vats.

Cross-examination by Mr. BANNING:

Q. 1. At what pressure do you usually treat the beer while in the shavings casks?

74 A. From six to eight pounds pressure. The gas cannot escape till it reaches that pressure.

Q. 2. As I understand, the first apparatus you used for thus treating beer in the shavings casks was made and first applied in 1878 or early in 1879. Is this correct?

A. I do not think it was applied later than the spring of 1878, but I am not positive about it.

Q. 3. When did you first put on the apparatus now in use?

(Counsel for respondent objects to the question on the grounds, first, that it is not cross-examination; second, that it is assuming that a second apparatus was applied.)

A. In the beginning of 1881.

Q. 4. That is, you first made the apparatus according to the cut in the circular of the Wallace Improved Fermentation Company in the beginning of 1881. What changes in the apparatus were made before that time, and when were they made?

(Counsel for respondent objects to the question on the grounds, first, that it is not cross-examination; second, that it is assuming that a second apparatus was applied.)

A. We first put the apparatus as represented in the cut referred to into use in the beginning of 1881. We first used an apparatus connecting the casks separately with the water column. We then placed a cylinder between the casks and water column on the line of pipes in the first half of the year 1880. There was a separate cylinder for each cask, so that the casks were not connected together by one cylinder or in any other manner.

Q. 5. In you answer to question 14, direct examination, you say that you have tried different kinds of apparatus for automatically controlling the pressure in the shavings casks. What other kinds have you tried than those already described, and when did you try them?

A. I have tried the apparatus described in the German book, on pages 357 and 358, already here in evidence. I tried it in the spring of 1881.

Q. 6. Before 1877 or about that time was any "bunging apparatus" or apparatus for automatically controlling the pressure of carbonic acid gas generated in shavings casks in actual use among brewers in this country, so far as you know?

A. Of my own knowledge, I know of none.

Q. 7. Is it not a fact that since that time this process of treating beer by automatically controlling the pressure of carbonic acid gas in shavings casks has come into very general and extensive use among brewers; or, at least, do you not so understand the fact?

A. Personally, I have seen but one ontside of ours. I understand that to be the case—that it has come into more general use.

Q. 8. In your opinion as a practical brewer, is it not a very important and valuable process in the manufacture of beer?

A. It is.

Re-examination by C. W. SMITH, Esq.:

Q. 1. In answer to question 6 of cross-examination you say you do not know, of your own knowledge, of any "bunging apparatus" or apparatus for automatically controlling the pressure of carbonic acid gas generated in the shavings casks being used among brewers in this country prior to the year 1877. Aside from your personal observation and inspection, what is your information on that subject?

(Objected to by complainant as calling for hearsay evidence.)

A. I have heard of one being used in an Eastern brewery, but I can't state where.

Q. 2. In answer to question 8 of cross-examination you say that, in your opinion as a practical brewer, the process of treating
75 beer by automatically controlling the pressure of carbonic acid gas in the shavings casks is a very important and valuable process in the manufacture of beer. I will ask you whether you understood or answered that question as referring to any particular form of applying the process or as referring to the process itself, however applied.

A. As referring to the process itself.

MATHIAS A. MAUS.

The further taking of depositions in behalf of the defendants was postponed to a day future, of which the complainant was to be fully notified.

The proper notice having been given to the complainant, the examination was held Friday, March 24, 1882, at the office of Duncan, Smith & Duncan, No. 76 East Washington street, in the city of Indianapolis, Marion county, State of Indiana, before Eugene G. Kreider, special examiner in chancery in this cause.

Present: Ephraim Banning, Esq., of counsel for complainant, and C. P. Jacobs, Esq., and C. W. Smith, Esq., of counsel for defendants.

Testimony of Clement A. Maus and Herman Sturm, Witnesses Produced by the Defendants.

The said CLEMENT ALBERT MAUS, being duly sworn to testify the truth, the whole truth, and nothing but the truth relating to said cause, deposes as follows:

Examined by C. P. JACOBS, Esq.:

Q. 1. What is your name, age, residence, and occupation?

A. My name is Clement Albert Maus; age, thirty-eight; residence, Indianapolis, Ind.; my occupation is a brewer, and I am one of the defendants in this action.

Q. 2. Are you acquainted with the construction and principle

of operation of the apparatus used by the defendants in their brewery at Indianapolis for regulating automatically the fermentation of beer?

A. I am acquainted with it.

Q. 3. At what time, if ever, were you in the beer-brewing business in Nashville, Tennessee?

A. From the fall of 1876 to July, 1878.

Q. 4. If during that time you had in operation in your brewery at Nashville any apparatus for regulating the fermentation of beer by means of a water column, please state when it was and describe it.

A. I did, in September, 1877, and afterwards till I ceased brewing at Nashville. I made it myself. On the cask I first put the faucet in the bung-hole, and connected it with an air-reservoir with hose and pipes. The air-reservoir is connected with a water column by means of a pipe. The cask had an ice-swimmer to keep it cool, and I had trouble in keeping it air-tight, and the air-reservoir was connected with an air-pump, and by that means I kept on pumping air into the reservoir, and from there into the cask, to keep up the pressure, as the cask was leaking.

Q. 5. How did you regulate the pressure upon the air in the reservoir?

A. By means of the water column.

Q. 6. I now exhibit to you a written paper, marked "specification," with a drawing attached made of India ink upon tracing paper, upon the bottom of which appears the name of "Clement A. Maus, inventor." Please examine the same, state where you first saw it, by whom it was prepared, and at whose request.

A. I saw it in Nashville, at John E. Bauman's office, some time during the winter, about five or six months after I first put the apparatus in operation, which was in September, 1877. The specifications are in Bauman's handwriting, and he made them at my request. This paper has been in my possession since that time, except when I made a new application for a patent through E. O. Frink.

76 Q. 7. That paper marked "specifications," exhibited to the witness, is now offered in evidence and marked by the examiner "Defendants' Exhibit C. A. Maus' Specification."

(Objected to as immaterial and incompetent, because not a certified copy.)

Q. 8. Do you know who made this copy of a drawing on tracing paper now exhibited to you?

A. I do not. I saw it first in E. O. Frink's hands.

Q. 9. Examine it and state whether it illustrates the device described in the "Exhibit C. A. Maus' Specification?"

A. That is a correct copy of the original drawing made by Bauman, and it illustrates the device described in said specification.

Q. 10. Said drawing is now offered in evidence, and is marked by the examiner "Defendants' Exhibit C. A. Maus' Drawing."

(Objected to as immaterial and incompetent, because not a certified copy.)

Q. 11. If you made any applications for letters patent upon your method of regulating fermentation state how many and when and where.

A. I made one while I was in Nashville, through John A. Bauman. The application was prepared in the fall of 1877, but not filed till the spring of 1878. I do not remember the exact date. That was rejected. There was nothing done with that any more till I came to Indianapolis. Then I showed it to E. O. Frink, solicitor of patents, and he made a new application for me. That was rejected. I made no further effort to get a patent.

Q. 12. When did you return to Indianapolis?

A. July, 1878.

Q. 13. What had you to do, if anything, with suggesting, or with the construction of the water-column apparatus used by the defendants in their brewery in this city, and when was it put in?

A. When I came back I explained the whole apparatus to them, and some months afer they put the apparatus in operation in their brewery. I explained it fully to my brother Mathias, and he made the addition of the cylinder above the cask, and he constructed the whole apparatus.

Q. 14. Apart from the cylinder suspended above the cask, which you say your brother added, wherein does the method of regulating the pressure during the fermentation of the beer by means of a water column, as used by the defendants, differ from the apparatus used by you in the fall of 1877, at Nashville, Tennessee?

A. The process is not different whatever.

Q. 15. How long have you been engaged in brewing beer?

A. Eighteen years.

Q. 16. What do you understand by the "kraeusen stage" in the manufacture of beer?

A. That only occurs in the "wort," in the first stage of fermentation, lasting generally about four or five days, when the beer is in the fermenting vats.

Q. 17. I now exhibit to you a printed copy of the drawing and specification of letters patent issued to George Bartholomae, dated April 2, 1878; examine the same and state what you understand, as a brewer, his improvement to be, having reference particularly to the claim marked number one, in connection therewith.

A. His principal improvement is in regulaing the pressure. It may assist a little in clarifying, perhaps, in one or two days out of twenty.

Q. 18. Regulating the pressure in what?

A. In a series of shavings casks.

77 Q. 19. Would there be any difference, so far as saving time is concerned, between the regulating of pressure automatically in one cask, or separate casks, or in a series of casks?

A. There would be a difference of a few hours' pressure; that is not noticeable in the time gained.

Q. 20. What was the practical effect in regulating automatically the pressure in the beer casks of the apparatus devised and used by you in Nashville in September, 1877?

A. In the first place the beer could be bunged as soon as the "krausen" was added. It regulated the pressure automatically. It worked well. It dispenses with filling up the cask every morning. I used it until I ceased brewing in Nashville.

Q. 21. To what casks or vessels containing the beer did you apply this apparatus in Nashville?

A. To the shavings casks, when the beer was in the third and last stage of fermentation.

Cross-examined by E. BANNING, Esq.:

Q. 1. What time in September, 1877, did you commence to use the apparatus referred to in your direct examination, at Nashville, Tennessee?

A. I don't remember the date; I suppose about the latter part of September.

Q. 2. You never used it before September, 1877, did you?

A. That was the first time I used it.

Q. 3. You put it into use immediately after you first thought about it, did you not?

A. I may have thought about it during the summer. My first experiment, made in September, did not work. I had a half-inch pipe instead of a four-inch water column.

Q. 4. How long did you continue to use the apparatus tried in that first experiment, and on how many casks did you try it?

A. I tried it on one cask. The first trial convinced me it would not work, as the pipe was not large enough. I found this out right away as soon as I put the pressure on the pipe. I think I took it off the same day I put it on.

Q. 5. Then, as I understand you, it proved a complete failure at that time. Is this correct?

A. That first trial; that is correct.

Q. 6. When did you make the second trial, on how many casks, how did it work, and how long did you continue to use the apparatus put on at that trial?

A. I made the second trial about two days later. I gave immediate orders for larger pipe. I tried it on one cask; it worked satisfactorily. I used it right straight along till I ceased brewing at Nashville. In the meantime I connected several casks. This was about two or three weeks after my second trial, and I continued to use the apparatus on a series of shavings casks till I left Nashville.

Q. 7. At what stage of the fermentation did you apply the apparatus in your second trial and subsequent use?

A. I applied it all the time in the shavings casks or third and last stage of fermentation. As a general thing, I bunged it up the next day after the "kraeusen" was put in; sometimes it might have been two days.

Q. 8. This drawing, "Defendants' Exhibit C. A. Maus's Draw-

ing," represents the apparatus, as applied in your second trial, to a single cask, as I understand it?

A. Yes, sir; it is a true representation of the apparatus applied in the second trial, with the exception of the pan C.

78 Q. 9. Was your second application for a patent made for the purpose of covering some improvements which you had made after the filing of your first application or merely to correct the first application so as to get the specifications or claims in better shape?

A. I suppose some changes were made. I do not recollect what changes, if any, were made.

Q. 10. At what pressure did you attempt to control the gas in the shavings casks in your operations at Nashville?

A. From six to seven pounds of pressure.

Q. 11. What benefits did you observe were derived from the use of the apparatus in those operations?

A. In the way of saving labor and beer used for filling the cask up. That was about all.

Q. 12. Did the apparatus and process as used in those operations prove as beneficial in its results as the apparatus and process now used on the defendants' shavings casks?

A. Everything the same, except that cylinder suspended above the shavings casks. It worked just as well apart from the cylinder.

Q. 13. Give the names of your cellar men and other workmen who knew about your use of the apparatus at Nashville.

A. Albert Vinetch, then living in Nashville; Joseph Bernaur, Leopold Wenzler, and two more at least whose names I do not recollect, nor do I know where they live.

Re-examination by C. P. JACOBS, Esq.:

Q. 1. The first experiment that you made at Nashville, as I understand you, failed because you used a half-inch pipe connecting the water reservoir with the shavings casks, did it not?

A. It failed because the pipe was too small.

Q. 2. After you connected the reservoir with the shavings cask by a larger pipe, what difficulty did you have, if any?

A. I had no difficulty then. It worked well.

C. A. MAUS.

The said HERMAN STURM, first being duly sworn to testify the truth, the whole truth, and nothing but the truth, deposes as follows:

Examined by C. P. JACOBS, Esq.:

Q. 1. What is your name, age, residence, and occupation?

A. Herman Sturm; age, 51 years; Indianapolis, Ind.; civil engineer and machinist.

Q. 2. What experience have you had in these occupations of which you speak?

A. I learned my profession in Europe, and have been engaged in that business in this country from 1848 until the breaking out of

the war. Since that time I have only partially been engaged in this business. In 1860 I was a partner of the firm of Sturm, Steffens & Co., of this city, and was engaged in manufacturing mathematical and philosophical instruments; also models and small machinery for inventors.

Q. 3. If you were ever applied to by brewers of this city to provide for them any device or devices for the automatic regulation of pressure of carbonic acid gas in beer casks, and if you manufactured any such device for such purpose, you may now state all the facts connected with the matter in narrative form.

A. Some time in 1860 Mr. C. F. Schmidt, a brewer of this city, took me to his brewery and requested me to get up an apparatus for him which would during the fermentation of the beer allow the carbonic acid gas to escape and at the same time prevent the
79 atmosphere from having access to the beer. I made him two such instruments, one of wood, partly, and the other one entirely of brass, with a rubber ball for a valve. I have a sketch of same here, which I produce and make a part of my deposition to illustrate my device, and which is as follows:

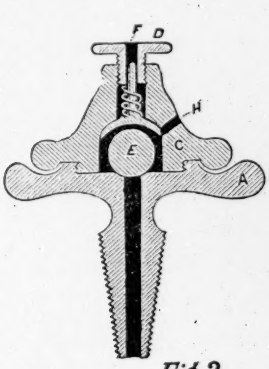


Fig. 2.

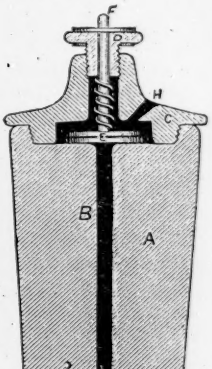


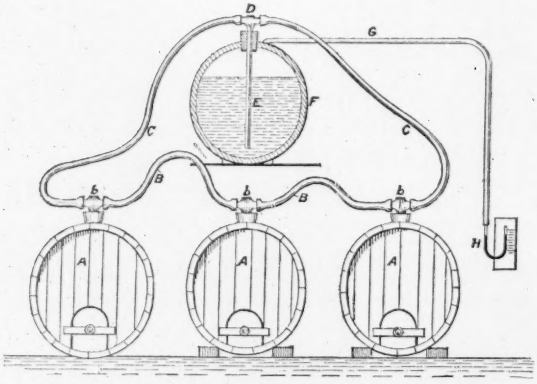
Fig. 1.

In the above sketch figure 1 is an ordinary bung of wood, perforated about a half inch, as at B. C was a metallic cap, screwed into the top of the bung. This cap is also perforated, and the perforated thumb-screw D is screwed in the top of the cap C. A valve, E, slides by means of the rod F in this thumb-screw, and is held down on the bung by means of spring G. This spring and the thumb-screw regulate the pressure with which the valve E is held down. The wooden bung A being inserted tightly into the bung-hole of the cask confines the carbonic acid gas in the same, which can only escape by lifting valve E, and through a hole bored into cap C, at H. By raising or lowering the thumb-screw D any amount of pressure can be given. The apparatus works completely automatically after being once regulated.

Figure 2 is identical with figure 1, except it is made entirely of brass and screwed into the bung of the cask. Instead of a metal

valve, E, I used an india-rubber ball, marked E. This apparatus also worked automatically after being once regulated to the pressure desired. After I had made some of these instruments they were applied at Schmidt's brewery to some large fermenting casks containing beer, and they worked to the satisfaction of Mr. Schmidt, except that a foam arising from the fermentation process would sometimes interfere and clog the valves, and Mr. Imbry, who had a brewery opposite the Madison depot, and for whom I had made some of these instruments, requested me to overcome this difficulty, if possible. I then got up a very simple apparatus, which is thus described: I inserted into the perforated bung of each fermenting cask a half inch or three-quarter inch brass tube, to which I attached an india-rubber tube of corresponding size. These india-rubber tubes from each cask were led to and were fastened at the other end by means of a many-way cock to a three-quarter inch brass pipe about three feet long, common to all, which was inserted through the bung of another cask to within six inches of the bottom of the same. This cask contained sufficient water to cover the end of the pipe introduced about two or three inches. The foam passing from the main fermenting casks through each of the branch pipes to this main pipe leading into the water would be washed off and dropped to the bottom, and the gas, after passing through the water, would pass through an instrument, figure 2, above described, which was inserted in the top of the water barrel, without clogging it. This apparatus was put up and used at Mr. Imbry's brewery on his fermenting casks, and I subjoin a sketch of it, which is as follows:

80



(*Device Made by Gen. H. Sturm and Applied by Him to Fermenting Casks in the Breweries of C. F. Schmidt and Charles Imbry, Indianapolis, Ind., in the Spring of* 1861.

A A A represent casks in which beer is fermenting.

B B, flexible tubes connecting the casks together at their bung-holes by the two-way cocks *b b b*.

C C are tubes connecting the casks with the wash-barrel F at the two-way cock D.

E, a pipe leading into the water in the wash-barrel.

G, a pipe leading from the air-space in the wash-barrel to the mercury gauge H.

The above is correct. H. STURM.)

Very soon after making this apparatus I simplified it very much by leading the gas from what I will call the washing-cask by means of an india-rubber tube to a glass syphon containing about two inches of mercury, which would be equivalent to about the pressure of one pound of atmosphere. In this way the apparatus shown in Fig. 2 was dispensed with, and the pressure could be regulated by adding to or reducing the height of the mercury column. This apparatus, I was informed by Mr. Imbry and by Mr. Schmidt, worked better than either of the vents shown in figures 1 and 2, being completely automatic. This last device with the mercury was used upon fermenting casks by both Mr. Schmidt and Mr. Imbry in 1860, just before the war. I think this same apparatus was used in Meikel's brewery about the same time. I quit the business in April, 1861.

Q. 4. Wherein lies the difference, if any, between the principle of operation of these four several devices described by you for regulating the pressure in fermenting casks?

A. The only difference I know of is that by using figures 1 and 2, without using the washing-cask of which I have spoken, the foam would clog the valves, and it was also necessary to regulate the pressure by raising or lowering the thumb-screws D. This was not necessary if the mercury gauge was used. I call it a "gauge," because it acted automatically as such after you had filled the syphon with the proper quantity of mercury.

Q. 5. Do these differences of which you speak relate to the principle of operation in each case, or to the mechanical construction rather?

A. They relate to the mechanical construction. The actual principle, so far as I know, is alike in all; that is, you regulate the pressure of carbonic acid gas in the fermenting casks automatically.

Q. 6. Then I understand you, in other words, that the only substantial difference between these several devices is that in the first three instances the carbonic acid gas escapes from the fermenting casks through outlets by overcoming the pressure of an elastic spring, and in the last case by overcoming the pressure of a column of mercury?

A. That is just the way they work, and that is all the difference.

Q. 7. Having reference now to your last-mentioned device, remove the mercury gauge, increase the water in your barrel so as to make it a water column; would or would not the weight of that
81 body of water regulate automatically the pressure of the carbonic acid gas in the cask?

A. It would, as a matter of course. By filling the cask with water until the surface of the water would be about two feet higher in the mouth of the pipe you would have the same pressure in the fermenting casks as you had by using the two inches of mercury.

Q. 8. In this latter case what would regulate the pressure in the fermenting casks?

A. The height of the water above the mouth of the pipe.

Q. 9. What would be the difference in principle of operation between the device changed as I have last mentioned and the four de-

vices described and figured by you as having been constructed in 1860?

A. The principle would be the same. The difference would be merely in the mechanical construction of the apparatus.

Cross-examined by E. BANNING, Esq.:

Q. 1. You have never been engaged in the brewing business or had any practical experience therein, have you?

A. I have not.

Q. 2. Did you ever see any of these devices which you say you made in 1860 in actual use?

A. Similar devices are used by chemists, and I got my idea from them. I do not claim that this is an invention of mine. It was perfectly old. There was nothing new about it. I saw the devices made by me in actual use at the breweries of Mr. Schmidt and Mr. Imbry. I saw them in use probably fifty times during the four or five months that they were experimenting with them.

Q. 3. Do you know what became of those devices?

A. I do not, for after I left the shop, at the commencement of the war, I never gave any more attention to them. Some time in 1869, and probably somewhat before that time, I saw castings at the brass foundry in this city made from my patterns, and I am under the impression that they were finished and made up at the Eagle brass works, in this city, but I do not know for whom.

Q. 4. As I understand you, you made those devices during the four or five months immediately preceding your going into the military service, in April, 1861; that you saw them experimented with at the two breweries named during those four or five months, and that you never saw or heard of them after that time. Is all this correct?

A. I never called at either of the breweries after the breaking out of the war. It is very likely, though, that I may have heard something about them, as my partners, who succeeded me in the business, would frequently consult with me, or rather would ask my advice, about such matters. What I did about the business was done during the latter part of 1860 and the beginning of 1861—until April.

Q. 5. How many of those devices did you make for each of the two breweries named?

A. I cannot recall the exact number now, but I do know that of the mercury gauges I made only two—one for each brewery. The making of the mercury gauges was about the last piece of work I did before leaving the business. I saw the mercury gauges in use several times.

Q. 6. Can you state the particular kind of casks to which your devices were applied, and for what particular purposes, and at what particular stage of the fermentation they were used?

A. I know too little of the brewing business and the terms used to give you a correct answer, I am afraid. The casks were large
82 casks, probably seven feet in diameter, lying in a row on their bilges. As my recollection serves me now, there was an open-

ing in the head on the under side, called the man-hole, which was closed. I understood that the beer in these casks was intended for lager beer particularly, and was undergoing the second stage of fermentation. Both of these brewers were Germans, and our conversation was conducted in German.

Q. 7. But you cannot state from your own personal knowledge on what kind of casks or for what purpose or at what stage of fermentation your devices were applied?

A. My knowledge on this subject extends only so far, that I saw the casks as I have described; that they contained beer in a stage of fermentation, which Mr. Schmidt or Imbry, either or both, told me was the "untergahrungs" process. I attached the apparatus myself to these casks.

Q. 8. But you do not know whether they were what are commonly called "shavings casks" or not, do you?

A. They had another kind of cask or vat open at the top and larger in diameter at the bottom than at the top. I do not mean these. I do not know anything about shavings casks or whether the ones to which my device was applied were shavings casks or not.

Q. 9. Do you know whether the beer was in that stage when there is a lively fermentation occasioned by the putting in of "kraeusen" or "young beer," as it is called?

A. No; I do not know. I am not familiar with that business and paid no attention to it. All I do know is that some time after I attached my devices an active stage of fermentation set in and foam would rise sufficient to interfere with the working of my devices, Fig. 1 and Fig. 2.

Q. 10. Do you know how long your devices were kept in use and for what particular purposes they were applied?

A. I cannot say how long they were kept in use, but the object, as I have already stated, was to confine the carbonic acid gas in the fermenting casks and to allow the same to escape without injuring the casks. As Mr. Schmidt said to me when he first spoke to me on the subject, the gas, if confined, would burst the cask, and if air had access to the cask it would spoil the beer, and his object was to prevent both of these actions. My apparatus accomplished these objects whenever I saw it during the last two or three months that I attended to the business.

Q. 11. Do you know whether your devices had any effect in hastening the clarifying of the beer, or whether it was then supposed to have any influence in the clarifying process?

A. I know nothing about it, as neither Mr. Schmidt nor Mr. Imbry let me into their secrets. They never said anything to me about the subject of clarifying. If they did I have forgotten it, it is so long ago, and I paid so little attention to it.

Q. 12. Did you frequently see Mr. Schmidt and Mr. Imbry after you went into the military service?

A. I hardly think that I had half an hour's conversation with either of them during the whole time of the war. I recollect seeing Mr. Imbry only once, in a saloon that he afterwards occupied.

After the war I went to Mexico, and was absent several years, and did not return till after Mr. Schmidt's death. Mr. Imbry had left in the meantime. I have never seen him since.

Q. 13. Did either of those gentlemen ever speak to you about your devices after, say, April, 1861?

A. I do not recollect any conversation with them after the breaking out of the war, though I have no doubt that we have met.

Q. 14. Have you ever heard in any way of their ordering or using other devices of the same kind after, say, April, 1861?

83 A. Not of Schmidt and Imbry, but I am satisfied that a similar device was put into operation at Meikel's brewery, and I do recollect that Mr. Ferdinand Steffens, one of my successors in the business, went to Louisville, Ky., with an apparatus of this kind, but I cannot say anything of the particulars. Some time in 1869 I furnished some money to Jacob W. Loeper to carry on the brass-foundry business in this city, and I saw there one of my devices, somewhat changed from my original plan, manufactured in considerable numbers, but I do not know where they went to. It was somewhat similar to Fig. 2, the thumb-screw, spring, and rubber ball being replaced by a strip of india-rubber or oiled silk.

Q. 15. These sketches which you have now produced and make a part of your direct examination are made from memory merely, and after a lapse of some twenty-one years since you had anything to do with the devices they are intended to represent, are they not?

A. Yes, sir; they are made from memory and are correct, for my memory on articles that I made at that time is very good.

Q. 16. Suppose that the decision in this cause should turn on the question whether your devices above mentioned were used for the particular purpose and at the particular stages of fermentation that the Meller & Hofmann invention is used for and at, and the court should come to the conclusion that he would have to determine that question from your evidence, would you then say that you are sufficiently certain as to those two matters—the purpose and stage of application—to justify the decision that the Meller & Hofmann patent is void?

A. I know too little of the Meller & Hofmann patent, or of any patent on the subject, to give a correct answer to such an important question. The operation of my devices is so simple that any expert in mechanism and in chemistry ought to be able to answer that question. The purpose of my devices was to confine the carbonic acid gas in the fermenting casks under a pressure sufficiently light not to injure the casks. What other object the brewers had they did not confide to me. The stage of fermentation at which my devices were used I have sufficiently described to enable a practical brewer to understand the matter correctly. If the court, from my statements, believes that my device accomplished the object of the Meller & Hofmann patent as well as it does, I should say there was not sufficiently new — in it for anybody to obtain a patent on it.

Q. 17. You have misunderstood my question. Not being a practical brewer, and not knowing the object for which your device was applied, or the stage of fermentation at which it was applied, except

as you were informed by Mr. Schmidt and Mr. Imbry, would you say that, if the decision should turn on your evidence, you are sufficiently certain in reference to those two matters to be willing that the court shall hold the Meller & Hofmann patent to be void, especially when otherwise it would be a valuable patent, covering an important process which has now gone into very general and extensive use, both in this country and in Europe?

Objected to by counsel for defendant for the following reasons:

1st. It assumes that the witness did not and does not understand the object for which the device was constructed and applied by him, and so not warranted by the testimony nor the facts in the case.

2d. It assumes that the witness did not and does not understand the stage of fermentation during which his devices were applied and operated, whereas the testimony discloses the contrary to be the case.

84 3d. It assumes the very question in issue, namely, that Meller & Hofmann were the first inventors of anything claimed or shown in the letters patent issued to them or that such patent is valuable; and for the further reason that the question is incompetent and irrelevant.

Counsel for complainant protests against any argument of the case on this record, and in reply to the above statements says that the only assumptions contained in the question are that the witness was not a practical brewer, and that he did not know, personally, the two matters mentioned, but, on the contrary, that all his information in reference thereto was derived from the statements of the two brewers named, and that these assumptions are fully warranted by the witness' statement.

A. I know positively that one object was to confine the gas as I have stated; the other object was to allow it to escape without admitting air into the cask; the third object was to regulate the pressure of the gas automatically. I know that my devices performed all these objects perfectly and satisfactorily. If the court should find that my devices performed these operations in the same manner and for the same purpose as the Meller & Hofmann patent, I should decide that my devices, being made so many years prior, and in use in this city, to my knowledge, in at least two breweries, would prevent Meller & Hoffmann or any other person from obtaining a patent on what I may call my own invention.

Q. 18. At what pressure were your devices applied?

A. The pressure that I applied was two inches of mercury, equivalent to about one pound per square inch. The tube was made long enough for about twelve inches of mercury, but the cask leaked when that pressure was put on. I reduced the pressure, as I recollect, to permanently one pound per square inch, which, as I was informed at the time, was sufficient. At a pressure a little above one pound the gas was allowed to escape.

Re-examination by C. P. JACOBS, Esq.:

Q. As I understand you, your devices were applied in the brew-

eries of Schmidt & Imbry to casks containing beer in such a stage of fermentation that foam containing particles of yeast would freely pass out from the vent of the bungs when they were used, and into the water-barrel when the mercury gauge was used; am I correct?

A. That is correct.

Q. 2. Do you mean to be understood that the use of these vent-bungs and the wash-barrel apparatus, with mercury gauge as contrived by you, in the breweries you have mentioned, was an experimental or practically successful use?

A. At first the first wooden bungs, of which I have spoken, were experimental, to show what could be done. The subsequent ones, made of brass, and finally the wash-barrel with the mercury tube, were for practical use, and were used as long as I had anything to do with the matter, which, as I have stated, was until the breaking out of the war.

Q. 3. Examine the cut, figured upon page 16 of the printed record of defendants' testimony, and state whether or not that substantially represents the construction of the vent-bung you saw at Loeper's brass foundry in 1869.

A. It is a correct sketch of those I saw in that brass foundry; I believe it was in 1869.

Q. Have you ever examined the drawings, specifications, or claims of the Meller & Hofmann patent?

A. No, sir; I have not.

Q. 5. Do you know anything about the issues made by the pleadings in this case?

A. No, sir; I do not.

85 Q. 6. From your experience in the construction of philosophical machines, and your knowledge of chemistry or pneumatics, state what difference there is, if any, in the automatic regulation of gases by such devices as you have described, whether confined in beer casks or any other closed vessels.

A. Not being an expert in chemistry, I will say that, in my opinion, it would make no difference whether the vessel is a cask or any other kind, or whether it contained beer or any other liquid, except that the gas would pass through a smaller column of water than beer for the reason that the beer has a greater specific gravity.

Recross-examination by Mr. BANNING:

Q. 1. As I understand you, you found the clogging occasioned by the working out of the foam and yeast particles a serious objection in the use of your devices represented by the drawing, figures 1 and 2. Is this correct?

A. It was an inconvenience, but did not interfere with the operation itself. The foam and yeast particles would run down over the cask, and that was objectionable, and, therefore, I used the wash bottle or barrel. The device, figure 2, applied to these wash-barrels worked perfectly, but was not so nearly automatic as the mercury column, as the springs had to be adjusted once in awhile, whereas the mercury column, once regulated, required no further attention.

Q. 2. Then you considered the mercury gauge a decided improvement on your previous devices?

A. Yes, sir; more convenient.

H. STURM.

Under a stipulation in writing, this day signed by the counsel for both parties, the defendants now offer in evidence the following printed copy of the specifications and drawings of the following letters patent of the United States:

No 62581, issued to George Wallace March 5, 1867, marked by the examiner "Defendants' Exhibit Wallace Patent:"

86 UNITED STATES PATENT OFFICE.

GEORGE WALLACE, of Cincinnati, Ohio.

Letters Patent No. 62581, dated March 5, 1867.

Improvement in Apparatus for Fermenting Malt and Other Liquors.

The schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it knownt hat I, George Wallace, of the city of Cincinnati, in the county of Hamilton, and State of Ohio, have invented a new and useful machine for regulating vinous fermentation in malt and other liquors; and I do hereby declare that the following is a clear, full, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

A is a perspective external view of an air-tight vat or tank; B, a cross-section of a similar vat or tank. C is an open tub or vat, and stands between vats or tanks A and B, and to contain water. Vats or tanks A and B have a tight inside shell or casing, D, allowing a current of water to circulate, which is supplied at pipes K and discharged at pipes L. Pipes E and F extend from the crown of each vat or tank, A and B, to near the bottom of the other vat or tank, across the lower end of which is a perforated cross-pipe. In the middle of pipes E and F are two-way cocks, H, designed to relieve the vats or tanks A and B of surplus pressure of gases by allowing them to escape through pipes G into vat or tub C, containing water, yet retaining any alcoholic gases that may arise; also to insure an equal fermentation in each vat or tank.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

I construct two large air-tight vats or tanks, as shown by letters A and B, which are filled at man-hole J, and drawn off at cock I. Each vat or tank has a tight inner shell or lining extending two-thirds up, between which and the outside shell there is a space, which is to be kept filled with water, which is supplied at pipes K and discharged at pipes L. This is to insure the proper tempera-

ture to the liquor in vats or tanks A and B during fermentation. Between the air-tight vats or tanks A and B, I place an open vat, C, containing water. In the top of each vat A and B comes out a pipe, E and F, which enters the opposite vat or tank, and extends to near its bottom, across the end of which is a perforated cross-pipe. In the middle of cross-pipes E and F are two-way cocks, H, which insures the regulation of the pressure and gases during fermentation. If one vat is fermenting faster than the other, the surplus gas is discharged in the other vat; or, if each vat has a surplus gas, it is then turned off through pipes G, and allowed to escape in the water in vat or tub C, which prevents alcoholic condensation and the atmosphere from getting into vats or tanks A and B.

Having thus fully described and set forth the nature of my invention, what I claim as my invention, and desire to secure by letters patent, is—

1. The water chamber D, by which the temperature of the liquor in vats or tanks A and B can be regulated during fermentation.

2. The application of the two-way cock, H, by which the fermentation of each vat or tank may be regulated; or, if a surplus amount of gases is generated, allows it to escape through pipes G.

3. The open tubs or vat C, containing water, which allows the non-condensing gases to escape, yet prevents the atmosphere from getting in the vats or tanks A and B.

GEO. WALLACE.

Witnesses:
JOHN McLACHLAN.
F. U. STOKES.

(Here follows diagram marked p. 87.)

88 No. 63636, issued to T. R. Hicks April 9, 1867, marked by examiner "Defendants' Exhibit Hicks Patent:"

UNITED STATES PATENT OFFICE.

THOMAS R. HICKS, of New Britain, Connecticut.

Letters Patent No. 63636, dated April 9, 1867.

Improved Vent-Plug.

The schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that Thomas R. Hicks, of New Britain, county of Hartford, and State of Connecticut, has invented certain new and useful improvements in vent-plugs, which he verily believes has not been known or used prior to his application for a patent, and, to enable others skilled in the art to make and use the same, will pro-

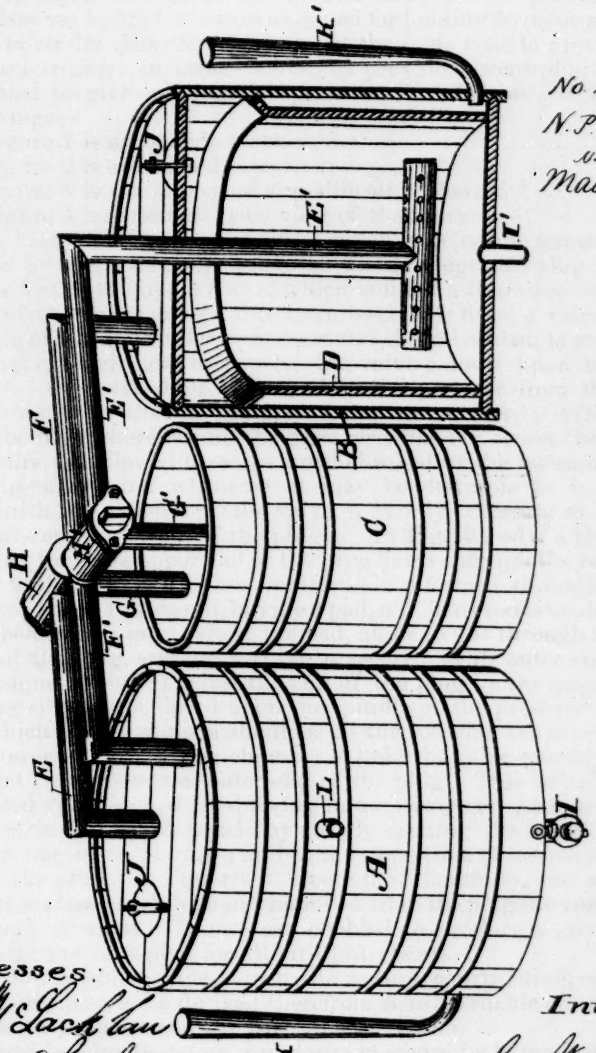
G. WALLACE.

Fermenting Vat.

No. 62,581.

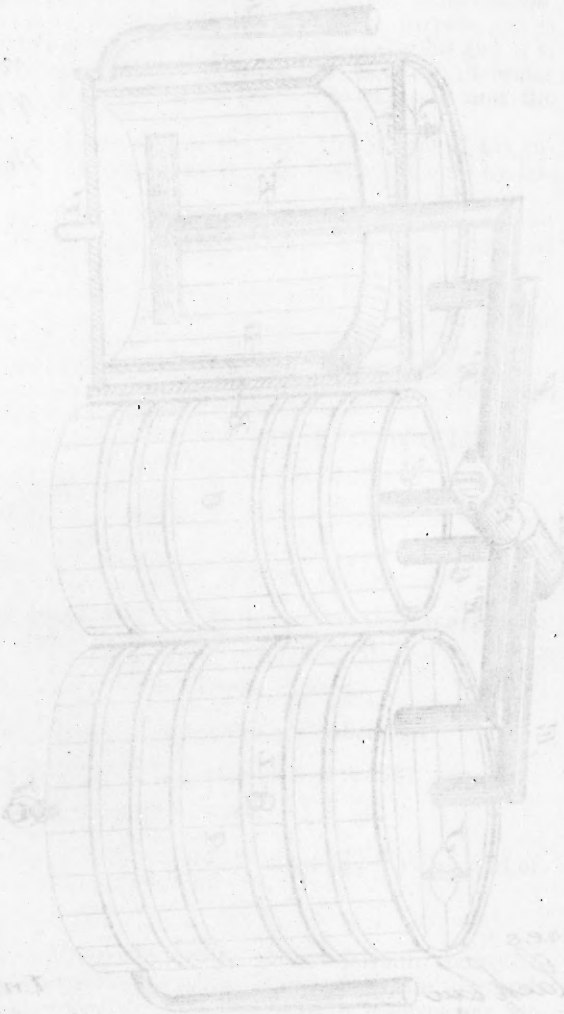
Patented March 5, 1867.

No. 298.
N.P.F.Co.
v.
Mausebar
p. 87



Witnesses.
John McLachlan
H. U. Stokes

Inventor:
Geo Wallace



ceed to describe by referring to the drawings, in which the same letters indicate like parts in each of the figures.

The nature of this improvement will be understood from the specification and drawings.

The object desired to be attained thereby is to provide a good, efficient vent-plug for vessels designed for holding fermenting liquors and to render them air-tight, and at the same time to prevent them from bursting; in other words, to provide a vent-plug specially adapted to give relief under pressure, &c. In the accompanying drawings—

Figure 1 is an outside view.

Figure 2 is a sectional side view.

Figure 3 is a side view of a modification thereof.

Figure 4 is a sectional side view of the same.

In Figs. 1 and 2, *a* is a stopper, which is driven or screwed into a vessel by means of a nut formation, *b*. Through this plug is formed an orifice, in the upper end of which is fitted a thumb-screw, *c*. Inside of the inner end of this thumb-screw is fitted a valve-stem, *d*. Inside of this thumb-screw and around the valve-stem is arranged a spring, *e*, which acts to depress the valve *g* down upon the valve-seat *h*. *i* is a vent-hole. Now, when the pressure from the inside is greater than that of the spring *e* upon the valve *g* it (the valve) will be lifted thereby, and the gases, or whatever causes the internal pressure, are allowed to escape until checked by the resistance of the spring-valve; and whenever it may be desirable to increase or diminish the pressure of the valve it is only necessary to turn the thumb-screw in or out of the plug *a*. In Figs. 3 and 4 a chamber is formed from the upper end of the plug down through the centre and near to the bottom; then a smaller hole is formed through the end thereof. *n* is a press-rod, having a pad, *n'*. This rod is made smaller just below the under side of the pad, and extends through the lower end of the plug, and has a valve, *o*, secured to its outer end, which is designed to bear against the end of the plug by the action of the spring *e*, which is placed upon the spindle of the press-rod, one end of which bears against a shoulder on the rod and the other against the lower end of the plug-chamber to hold the valve *o* firmly against its seat on the lower or outer end of the plug. This is particularly adapted and designed for drawing liquors which are kept in air-tight vessels, in the use of which, by simply opening the faucet through which the liquor is drawn and at the same time press down the pad *n'* of the plug, the liquor will freely flow therefrom, and when the faucet is closed and the hand removed from the plug the vessel again becomes air-tight. Thus I am enabled to produce a good, cheap, and efficient vent-plug for all air-tight vessels.

I believe I have thus shown the nature, construction, operation, and advantage to be derived therefrom so as to enable others skilled in the art to make and use the same therefrom.

What I claim, therefore, and desire to secure by letters patent, is—

As a new article of manufacture, a spring-pressure vent-plug, constructed substantially as and for the purpose described.

THOMAS R. HICKS. [L. S.]

Witnesses:
MERRITT BRONSON.
S. ROCKWELL.

(Here follows diagram marked p. 89.)

90 No. 90349, issued to W. Dietrichsen, May 25, 1869, marked "Defendants' Exhibit Dietrichsen Patent:"

UNITED STATES PATENT OFFICE.

WILLIAM DIETRICHSEN, of Newark, New Jersey.

Letters Patent No. 90349, dated May 25, 1869.

Improved Apparatus for Preserving Beer.

The schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, William Dietrichsen, of Newark, in the State of New Jersey, have invented a new and useful apparatus for preserving beer; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon:

The nature of my invention consists in supplying air into a beer barrel as fast as the beer is withdrawn out of the same, and, at the same time, prevent the escape of the carbonic acid gas out of said barrel, whereby beer may be preserved for any length of time after the barrel has been tapped.

When a barrel of beer is tapped the bung-hole must be opened to admit a sufficient quantity of air into the barrel to prevent the formation of a vacuum in the same; but, by this opening of the bung-hole, while the air is admitted the carbonic acid gas is at liberty to escape freely, destroying thereby, in a very short time after the barrel is tapped, the good qualities of the beer.

My apparatus consists of two air-tight chambers or vessels, A A′, of equal capacity, fastened together in any convenient manner and provided with a suitable bearing, B, resting in a frame, C, and capable of turning around on its bearings.

The chamber A is provided with a suitable opening, D, closed by a screw-cap or any other contrivance for the purpose of filling said chamber with water.

The two chambers are connected together by pipes N and N′, provided with cocks E and E′.

To the ends of each chamber A and A′, nearest to the bearings B, pipes F and F′ are fastened, provided with suitable cocks, *n n′*, and arranged so as to allow a flexible tube, G, to be attached to the ends of either the pipe F or F′.

T. R. Hicks,

Cask Air-Vent,

No. 63,636, Patented Apr. 9. 1867.

No. 298.
N.P.F. les.
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Mausell al.
} p. 89

Fig. 4. Fig. 3.

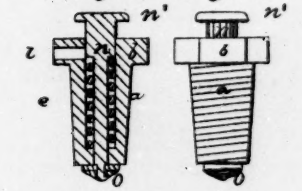
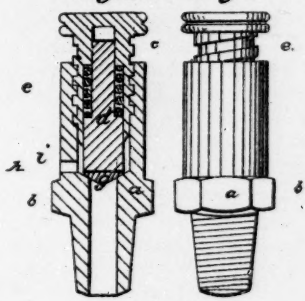


Fig. 2. Fig. 1.



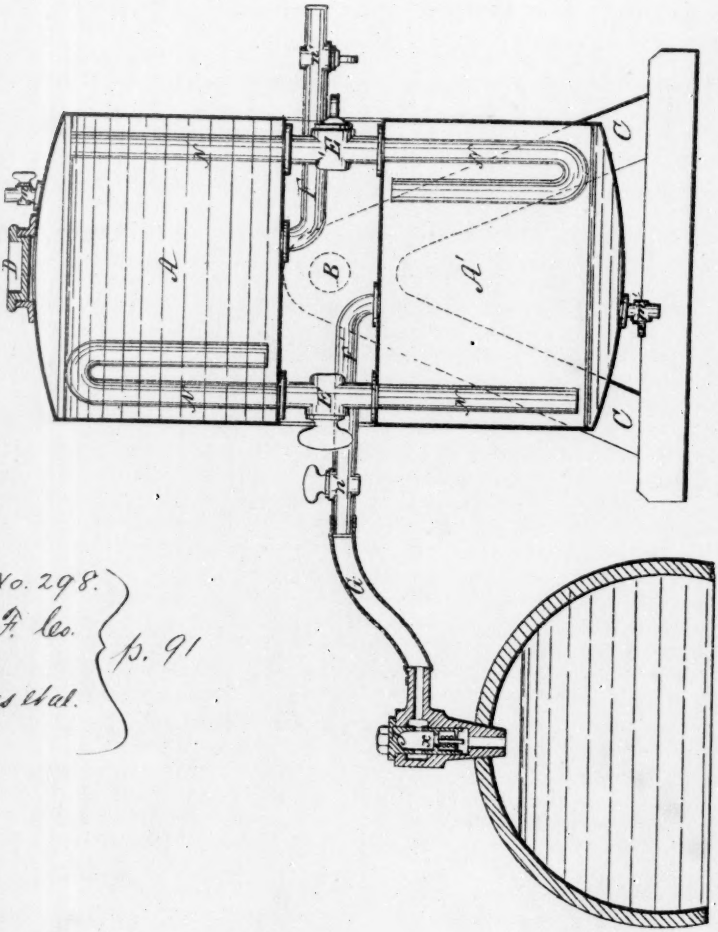
Witnesses
Merritt Bronson
S. Rockwell

Inventor
Thomas R. Hicks
By F. W. Bligs

W. Dietrichsen

Preserving Beer.

No. 90,349. Patented May 25, 1869.



No. 298.
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Maus et al.
} p. 91

Witnesses.
Henry E. Racder
Ulysses Baker

Inventor.
W. Dietrichsen

On the outer ends of the chambers A and A′ small air-cocks, *m* and *m′*, are fastened.

On the end of the flexible tube G a plug, J, is fastened, provided with a small check-valve, *x*.

The operation is as follows:

All cocks being shut, the chamber A is filled with water through the opening D when this opening is closed tight and the air-cock *m* opened. The plug J is then driven into the top of a beer barrel to be tapped, and the other end of the flexible tube G connected with the end of the pipe F′ attached to the inner bottom of the chamber A′. The cocks E and *n′* are then opened. The valve *x* in the plug J will be kept shut by the pressure of the gases contained in the beer barrel.

The water in the chamber A will pass through the pipe N, as soon as the cock E is opened, into the chamber A′, compressing thereby the air contained in said chamber, and forces the air out of this chamber A′, through the pipe F′, into the beer barrel as fast as the beer is withdrawn out of the barrel, without allowing any escape of the carbonic acid gas or any other gases contained in said barrel.

When the water has all passed from the chamber A into the chamber A′ the cocks E, *n′*, and *m* are shut, the flexible tube G is disconnected from the pipe F′, and the apparatus turned around its centre, B, so that the chamber A′ will come on the top.

The flexible tube G is then connected with the end of the pipe F, and the cocks *m′*, *n*, and E opened, when the water now contained in the chamber A′ will pass into the chamber A, displacing the air now contained in this chamber A, compressing and forcing said air through the pipe F into the beer barrel, in the same manner as above described.

The pipes N and N′ are arranged to prevent any noise from the water falling from one chamber into the other, and may be dispensed with and only one connection made between the two chambers, provided with a suitable cock.

What I claim as my invention, and desire to secure by letters patent, is—

The construction of two chambers or vessels, A and A′, connected together by a pipe or pipes provided with suitable cocks, and provided with escape-pipes, F and F′, the whole being combined and arranged to turn on its axis, B, and operating in the manner and for the purposes described.

W. DIETRICHSEN.

Witnesses:
HENRY E. ROEDER,
ULYSSES BAKER.

(Here follows diagram marked p. 91.)

92 No. 115,950, issued to William Gilham June 13, 1871, marked "Defendants' Exhibit Gilham Patent:"

115,950.

UNITED STATES PATENT OFFICE.

WILLIAM GILHAM, of Richmond, Virginia.

Improvement in Processes and Apparatus for the Manufacture of Sparkling Wines.

Specification forming part of Letters Patent No. 115,950, dated June 13, 1871.

I, William Gilham, of the city of Richmond and State of Virginia, have invented a new and improved process and apparatus for the manufacture of sparkling wine by its own fermentation in bulk, of which the following is a specification:

Nature and Objects of the Invention.

The object of my invention is to produce sparkling wine in bulk or on a large scale by causing the wine to become charged under great pressure with the carbonic acid gas generated by itself during the process of fermentation, thus forming a natural sparkling wine similar to that which has hitherto only been produced on a small scale by bottling unfermented wine, and not a factitious article, such as may be produced by the injection therein of gas derived from other sources.

The first part of my invention relates to the process above alluded to, the essential part of which consists in confining
93 the wines in an incipient state of fermentation and in large quantities within strong and tight vessels provided with proper tubes or pipes and valves or cocks, until the wine shall have sufficiently fermented to become charged with gas under any proper degree of pressure, when it may be drawn off and bottled, thus greatly reducing the expense and difficulty incurred in producing wines of this class.

The second part of the invention relates to the apparatus by which the above result is effected, illustrated forms of which will be hereinafter described, as follows: First, an exterior metallic casing or wine tank, made so as to be air or gas tight under strong interior pressure, and adapted to contain an interior open vessel of wood or other proper material, the apparatus being provided with a series of pipes and cocks for filling and drawing off its contents, and also with a safety-valve and pressure-gage; second, a metallic wine-tank, as above, containing an interior vessel provided with a tight head or cover, and having a system of pipes, &c., arranged in a manner slightly differing from the first; third, a triple or three-way valve-cock, which is preferably used as a substitute for the arrangement of pipes and cocks shown and described under first.

94 *Description of the Accompanying Drawing.*

Figure 1 is a vertical section illustrating the first form of my apparatus. Fig. 2 is a vertical section, on a larger scale, illustrating the second form thereof, having an arrangement adapted to act as a safety, pressure, and vacuum valve. Fig. 3 is a vertical section illustrative of a wine-tank with flanged cast-metal head, having a triple or three-way cock attached. Fig. 4 is a sectional elevation of my improved triple valve cock. Fig. 5 is a horizontal section of the same on the line *x x*, Fig. 4.

General Description.

A represents an exterior metallic casing or wine-tank, made preferably of wrought iron, and of sufficient strength to resist an interior pressure of one hundred and fifty pounds or more to the square inch, and supported in suitable manner. It is made in two parts, so that access may be had to its interior when required. These may be equal flanged cylinders united by bolts, as shown in Fig. 1, or a plate-iron cylinder, with cast-iron cap, as shown in Fig. 4, may be employed, the joints in either case being made gas-tight by packing. B is a cylinder or cask, which may be of wood, and either open or closed at top. It nearly fills the interior of
95 the tank A, but may be removed therefrom when necessary.

In that form of apparatus shown in Fig. 1 the tank has three openings for the reception of the pipes C D E, two of which communicate with the air-space above the wine in the cask B, while the third E is a duplicate pipe, one branch of which passes downward to within a few inches of the bottom of the cask, while the other extends to the bottom of the same. Both may have a common cock. The pipes C and D, to the former of which is connected a safety-valve and to the latter a pressure-gage, are also provided with cocks. These pipes open into the space above the liquid.

In the apparatus shown in Fig. 2 the cask B is provided with a tight head, B′, having three apertures for the insertion of the pipes C D E, while a fourth aperture is formed in the head of the tank A for the reception of the curved pipe F, which forms a branch of the safety-valve pipe C, and communicates with the space over the head of the cask B.

96 This pipe, after ascending upwardly from the opening in the tank, is recurved, passing into the glass tube or enlargement F, connected by the horizontal tube *f* to the similar tube G, which communicates with the pipe *c*, above which a safety-valve is connected with the pipe. The tubes F and G are each partially filled with mercury. The construction, arrangement, and attachment of the pipes D and E are similar to those of the corresponding pipes above described.

The form of tank shown in Fig. 3 has a cast-iron head with a flange, by which it is connected to the flanged body of the tank, and a single opening to receive the triple cock H, more fully shown in Figs. 4 and 5. The cock H has three separate connections with the interior of the tank through the openings *h* h^1 h^2, one being provided

with a glass or plated metal tube extending to within six or eight inches of the bottom of the cask B for drawing off the clear wine. The second has a similar tube extending to the bottom of the tube, and the third opens into the gas over the wine. The cock has three branches, h^3 h^4 h^5, for the attachment of corresponding exterior pipes. When testing pressure the gage may be attached to either of the branches connecting with the tubes leading into the wine; but the safety-valve can only be attached to the one communicating with the gas above. The openings h h^1 h^2 are provided with conical valves h^6 h^7 h^8 (fitting corresponding seats), which may be operated to open or close, as desired, by means of the regularly headed screw-plugs h^9 h^{10} h^{11}, which work through the caps covering the three heads of the device.

The advantages of this cock in connection with a tank having but one opening is that there is less liablity to leakage or escape of gas than where each pipe passes through a separate opening.

For greater economy and effectiveness it is preferred to make the tanks of large size—say four feet in diameter and eight feet high. They should be able to bear a pressure of at least one hundred and fifty pounds to the square inch.

Operation.

The cask B is partially filled with new wine in an active state of fermentation. In the first and third forms, where an open interior vessel is used, the wine may occupy two-thirds of the interior capacity of the tank A. Where a closed interior vessel is employed the wine should not more than two-thirds fill the latter. Sirup may be added at this time, or at a later period, through the pipe D, as the manufacturer may prefer or the condition of the wine may require. The stop-cocks are left open for a day or two that the atmospheric air may be expelled by the gas generated in the wine, after which the cocks *d e* are closed and the safety-valve adjusted to the required pressure—one hundred pounds, for example, to the square inch. When the pressure reaches the desired maximum any excess of gas will escape through the valve, and will continue to be discharged until fermentation ceases. When the process of fermentation is completed the cock *c* is closed, and when the wine has become thoroughly cleared by the deposition of its sediment the shorter branch of the pipe E is connected with the bottling-machine and the wine bottled in the same manner as soda-water. After the clear wine has been drawn off a filter is attached to the longer branch of the pipe E, which is in like manner connected with the bottling-machine, and the turbid wine near the bottom of the cask is drawn off and bottled in a similar way. The process is the same when the second form of apparatus is used. In this case, however, the interior pressure on the cask B must be balanced in order to prevent bursting or blowing out of its head. This is effected by means of the tubes F *f* G, which communicate with the safety-valve and interior space over the head of the cask B, an excess of pressure within the cask causing the mercury within the tube G to be depressed, while that in F rises until the gas is permitted to flow over through G *f* F *f'* into the space

over the head of the cask and establish an equilibrium of pressure within and without the same.

In order to maintain a constant and uniform pressure over the wine as it is drawn off and prevent the escape of the gas naturally confined therein, the safety-valve may be removed and the pipe connected to a gas-generator under a pressure slightly greater than that on the interior of the apparatus. This does not permit any of the gas within the wine to escape, while the wine, being already fully saturated, will not take up any of the gas forced in by the generator.

Claims.

I claim as my invention—

1. The process of producing sparkling wine by its own fermentation in bulk, by enclosing it in tight vessels provided with suitable pipes and cocks, and causing the wine to become charged with the gas generated by its own fermentation under any required amount of pressure, substantially as herein set forth.

2. An apparatus comprising an exterior closed vessel, A, and open interior vessel B, in connection with a series of pipes or tubes, C D E, provided with cocks *c d e*, safety-valve I, and pressure-gage J, all constructed, arranged, and operating substantially as and for the purpose herein described.

3. An apparatus comprising an exterior closed vessel, A, and interior closed vessel B, in connection with a series of tubes, C F′ F G D E, provided with cocks *c d e*, safety-valve I, and pressure-gage J, as and for the purposes herein specified.

4. The compound three-way cock H, having three sets of openings, $h\ h^3\ h^1\ h^4\ h^2\ h^5$, provided with conical valves or plugs $h^6\ h^7\ h^8$, substantially as and for the purposes specified.

5. The flanged wrought or plate metal tank A, having a cast-metal head, A^2, with a single opening, a^2, in combination with the three-way cock H, pipes C D E, and interior vessel, B, substantially as and for the purposes described.

To the foregoing specification of my improved process and apparatus for manufacturing sparkling wine by its own fermentation in bulk I have set my hand this 20th day of April, 1871.

WILLIAM GILHAM.

Witnesses:
JOHN OTT.
JOHN EVANS, JR.

(Here follows diagram marked p. 97.)

98 No. 201,982, issued to George Bartholomae April 2, 1878, marked "Defendants' Exhibit Bartholomae Patent:"

UNITED STATES PATENT OFFICE.

GEORGE BARTHOLOMAE, of Chicago, Illinois.

Improvement in Processes for Fermenting Beer.

Specification forming part of Letters Patent No. 201,982, dated April 2, 1878; application filed December 10, 1877.

To all whom it may concern:

Be it known that I, George Bartholomae, of Chicago, county of Cook, and State of Illinois, have invented certain new and useful improvements in the art of making beer, and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which the figure represents a vertical cross-section of my apparatus.

Heretofore, in brewing beer, after cooking and cooling, the beer is put into open vessels to ferment. The fermentation lasts, say, fifteen days, and then the beer is drawn off from the yeast into large casks, nearly closed, where it remains from one to six months to settle, and among the sediment there will still remain some yeast. The beer is then pumped into the "shavings casks," and is mixed with young beer (kraeusen), which starts a mild refermentation, lasting from ten to fifteen days, until the generation of the gas is reduced to a minimum. During this fermentation the beer effervesces through means of the carbonic acid gas rising, and the lighter particles are thrown to the top, forming a foam, which, during the ebullition, runs over the edges of the opening in the casks, and carrying along a small portion (more or lees) of the beer, which is wasted, and this waste has to be replaced by refilling with new beer daily. This wastage I estimate, from practical experience in the manufacture, to be about one barrel in every forty, more or less. This waste beer, running down around the casks and on the floor of the cellars, sours and produces a mildew which impregnates the air with foul vapors highly injurious to the workmen, and permeating the beer in the casks alter*ing* its flavor, and, in instances where the mildew penetrates the wood of the casks, spoiling the beer entirely. This fouling of the barrels requires that they should be washed outside from time to time, and the water used in this washing raises always the temperature of the cellar, and wastes the ice which is therein packed to keep the temperature about 41° Fahrenheit. After the beer has been in the shavings casks from ten to fifteen days, the gelatine or other clarifying medium is introduced, and at the end of a couple of days the beer is entirely clear. The shavings cask is then bunged up tightly for from three to five days, to confine the last portions of the rising carbonic acid gas. This charges the beer with carbonic acid gas (CO_2), so as to make it merchantable, and it

must be drawn off at once into kegs and used; otherwise the pressure on the shavings cask may burst it.

In selecting the time for drawing off the beer from the shavings casks into the kegs to send it to market, the beer should never be under a pressure of over seven pounds to the square inch; otherwise the keg fills with foam in the drawing off, and the bubbles, subsiding, leave an air-space over the liquid beer, which absorbs a portion of the carbonic acid gas, and soon leaves the beer in the keg flat. Arriving at the proper decree of pressure when to put the beer in kegs is, as the art is now practiced, merely a matter of judgment or guess by the foreman, and no two shavings casks will be drawn off at precisely the same pressure, and the effervescing qualities of the beer will vary considerably, much to the detriment of the sales by the brewer.

If the beer is not put in market at once at this stage the bungs have to be removed from the casks and the gas allowed to escape. Then the escaping gas stirs up the yeast and impurities that have settled to the bottom, and the beer has to go through again the entire shavings-cask step in the process.

Under the processes now in use it requires about twenty days to put beer on the market after it is pumped into the shavings casks. This delay requires brewers to keep a large amount of capital invested during the time in unfinished beer, and it is highly important to decrease this time of preparation.

The object of my invention is to overcome the difficulties abovenamed, and also to produce in a shorter time a better beer, containing more sugar and less alcohol.

My invention consists in treating the beer when in the shavings-cask step of the process of manufacture, in a series of closed casks under equalized automatically controllable carbonic acid gas pressure, generated by the mild fermentation of the beer. This equalizes the pressure in all the casks, and the effervescing quality of the beer in all the casks is uniform.

99 The casks being closed, none of the beer wastes by running over, and the foul smells and washing of the casks and cellars are avoided. The escaping carbonic acid gas is conducted from the relief-valve to the open air, and does not settle in the brewing cellars to endanger life.

In order that those skilled in the art may make and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A A are shaving casks having faucets *a a*, provided with valves *i i* inserted tightly in their bungs. These faucets are connected to taps N on the main pipe *a'* by means of flexible sections *k*, provided with couplings. The taps or connections N have valves *i' i'*. Pipe *a'* bends upward and passes above the level of a water column, C, and then passing downward enters the base of the column at *x*, where it is provided with a cock, *b'*. The water column or vessel C has a faucet, *d*, to draw off water when desired to decrease the pressure. A depending branch-pipe, *e*, and cock *e'* serve to discharge any condensed moisture from pipe

a', and a pressure-gage, e^2, serves to indicate the pressure.
100 By means of a gas-generator, located at h and connected to pipe a' by means of pipe f, having cock g, I am enabled to test the joints of the apparatus and drive all atmospheric air from the pipes when the operation begins.

At the top of the water column is a conical cap terminating in a pipe, E, which is projected out of the building and leads all the gas into the open air. Located within this cap is a conical diaphragm, C′, centrally located, so that should the escape of the gas become so rapid as to lift the body of water upward the water will be arrested by the diaphragm while the gas escapes around its edges.

It is evident that the pressure in all the shavings casks connected with pipe a' will be equal and be kept so indefinitely by means of the water column, and, as far as the enlivening of the beer is concerned, it is always ready for market, be it in ten days or four months, whereas in processes now practiced beer has to be "bunged" at a particular time for a particular day's market. My process enables the brewer to keep on hand merchantable beer which can be shipped instantly; or, if trade decreases, it enables him to keep his stock on hand without deterio-ation till the demand is made for it.

101 By using my apparatus I am enabled to clarify the beer and clear it of impurities in eight days or less, whereas in the ordinary processes it takes from twelve to twenty days. This immense gain in time I ascribe to the following action: The air being forced out of the pipes, the carbonic acid fills them and the space in the casks above the beer; then the gas slowly accumulates in the space above the beer until the pressure above is such as to overcome the density of the beer and re-enter it, so as to charge it up to the pressure for which the column is set. This creates, in a a manner, an equilibrium between the rising bubbles and the pressure above, during which gravity can act rapidly on the yeast and impurities of the beer and carry them down among the shavings at the bottom of the cask, where they remain.

I introduce the clarifying gelatine into my shavings casks after the beer is introduced and before connecting with pipe a', and actual practice has demonstrated to me that to clarify the beer by my process only requires about one-half of the gelatine heretofore used. This saving, together with the saving of the waste beer heretofore mentioned (one or more barrels in every forty), and the saving of labor, will greatly cheapen the production of beer.

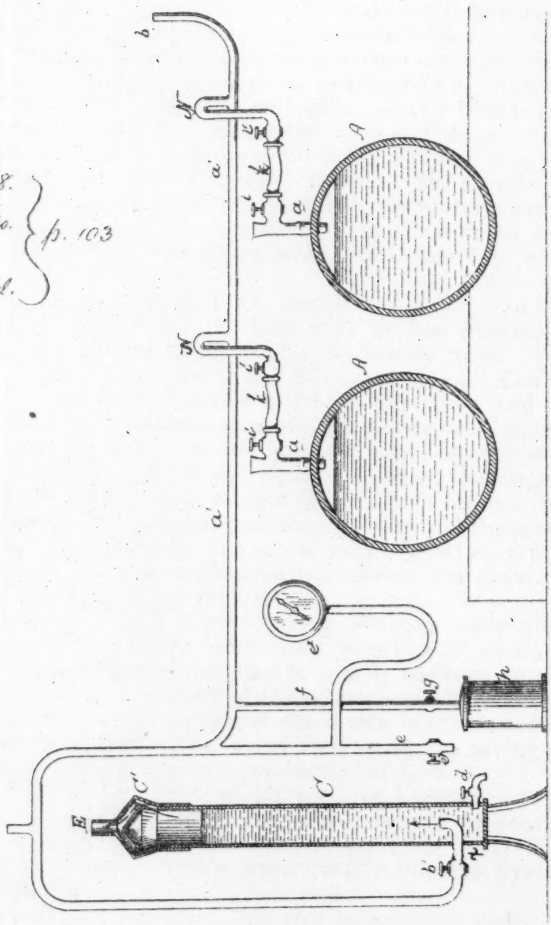
102 When I desire to make beer for bottling, I attach my apparatus to the settling casks filled with beer, and no young beer (kraeusen) is added, but a little gelatine is added, and this remains for from fourteen to twenty days, until it becomes lively, and it is then bottled.

I find that bottled beer prepared this way is healthier, and will last in good condition two or three months, whereas the beer bottled now last- only for eight or ten days, if pure and not steamed after bottling, the latter spoiling the aroma and flavor.

G. BARTHOLOMAE.

Process for Fermenting Beer.

No. 201,982. Patented April 2, 1878.



No. 298.
N. P. F. Co.
v.
Maus et al.
p. 103

WITNESSES:

C. Clarence Poole
Jos. H. Evans

INVENTOR:

George Bartholomae
Per atty A. H. Evans & Co

Having thus described my invention, what I claim as new, and desire to secure by letters patent, is—

1. The process of clarifying and settling beer in a series of shavings casks, and equalizing the rate of fermentation in all of them, whereby the beer is more rapidly and thoroughly clarified, and will be ready for racking off in all the casks at the same time and can be kept so, which consists in holding the beer in closed connected shavings casks under automatically controlled low pressure of the generated carbonic acid gas, substantially as described.

2. Casks A A, provided with cocks *a a*, flexible sections *k*, and taps N N, in combination with main pipe *a'*, water column C, and pressure-gauge c^2, all constructed, arranged, and operated as and for the purposes set forth.

GEORGE BARTHOLOMAE.

Witnesses:
FRED. W. WOLF.
L. LEBLE.

(Here follows diagram marked p. 103.)

104 No. 204,687, issued to Henry Schlaudeman June 11, 1878, marked "Defendants' Exhibit Schlaudeman Patent:"

UNITED STATES PATENT OFFICE.

HENRY SHLAUDEMAN, of Decatur, Illinois.

Improvement in Safety-Valves for Fermented-Liquor Casks.

Specification forming part of Letters Patent No. 204,687, dated June 11, 1878; application filed June 23, 1877.

To all whom it may concern:

Be it known that I, Henry Shlaudeman, of Decatur, in the county of Macon and State of Illinois, have invented certain new and useful improvements in safety-valves for casks of fermented liquors, reference being had to the accompanying drawing, in which the figure is a vertical section of my safety-valve.

The object of my invention is to produce a safety-valve to be placed upon storage-casks, hogsheads, &c., in which malt and other fermenting or fermented liquors are placed "in stock"—viz., before drawing into vessels for consumption or sale—and is constructed so that the weighted valve will be raised automatically if more than a certain quantity of carbonic acid gas is generated, and allow said gas to escape without exposing the liquors to the open air, and by thus excluding the air stopping fermentation at a fixed degree, and preventing the bursting of the cask or hogshead, the device inclosing a weighted valve that shall have a fixed and definite capacity of retaining the gases.

In the drawings, A is the valve-case, provided with the vent *a*, for the escape of the gas. B is a cap on the valve-case. C is the weighted valve, provided with the soft rubber *c*, or other suitable packing, to close the valve-seat and exclude the air. The rod D, attached to or formed upon the top of the valve C, passes through a hole in the cap and serves as a guide for the valve. E is a verti-

cally-projecting conical valve-seat, with an opening, *e*, through the whole length. It is screwed in the bottom of the valve-case, and its lower end is slightly conical, and screw-threaded to secure it in a hole though the bung of a cask.

Thus constructed, the valve can be readily taken apart for cleaning.

The form of the valve and valve-seat may be slightly varied; but it is desirable that the points of contact of the two should extend upon a small surface only, to prevent sealing of the valve by agglutination, and the part of the valve resting on the valve-seat be of yielding material, so as to retain the amount of carbonic acid gas in the liquor that is desired, and so that if the liquor should generate more gas than is desired it will raise the valve and allow the gas to escape in the case and through the vent *a*.

The weighted valves are made of different capacities, but so fixed or numbered that each valve shall have a definite capacity.

These valves are generally used by careless and inexperienced workmen, and unless the valve has a fixed and definite capacity, and is so constructed as not to easily get out of order or be tampered with, the same danger is encountered as in "over-bunging"—viz., the bursting of the cask by the accumulation of gas.

The rod or guide D, extending above the cap, allows the valve to be raised by hand, and the sound of the gas in escaping indicates the stage of fermentation and the condition of the liquor.

This valve is particularly useful in casks containing lager beer that is undergoing the "cleaning process," preventing the danger of over-bunging, and thereby the beer from becoming "too wild" before drawing off into barrels and kegs, and also when the air-pump is used in forcing the beer from the cleaning-casks into smaller vessels, as the surplus air and gas will escape through the valve without endangering the cask.

I am aware that vent-plugs controlled by spring-pressure, or adjustable spring vent-valves regulated by a thumb-nut, are not new; but the first cannot accomplish the result that I have in view (automatic relief to casks), and the second can be too easily tampered with to be reliable and safe.

Having thus described my invention, I claim—

1. A safety-valve for casks of fermenting liquor, having a predetermined and fixed capacity for retaining and allowing gases to escape, formed of a weighted valve having a projecting stem, and provided with an elastic packing placed in a recess in its lower end, resting on the upper extremity of a perforated conical valve-seat, substantially as shown and described.

2. The combination of the case A and valve C, having a projecting stem, D, and inclosing a soft rubber packing, *c*, with a perforated conical valve-seat, substantially as and for the purpose set forth.

HENRY SHLAUDEMAN.

Witnesses:

CHAS. M. FLETCHER,
CHAS. P. HOUSUM.

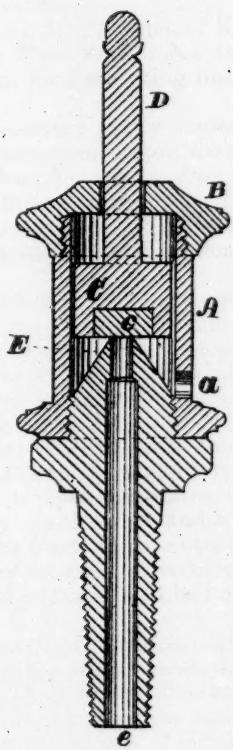
(Here follows diagram marked p. 105.)

H. SHLAUDEMAN.

Safety-Valve for Fermented-Liquor Cask.

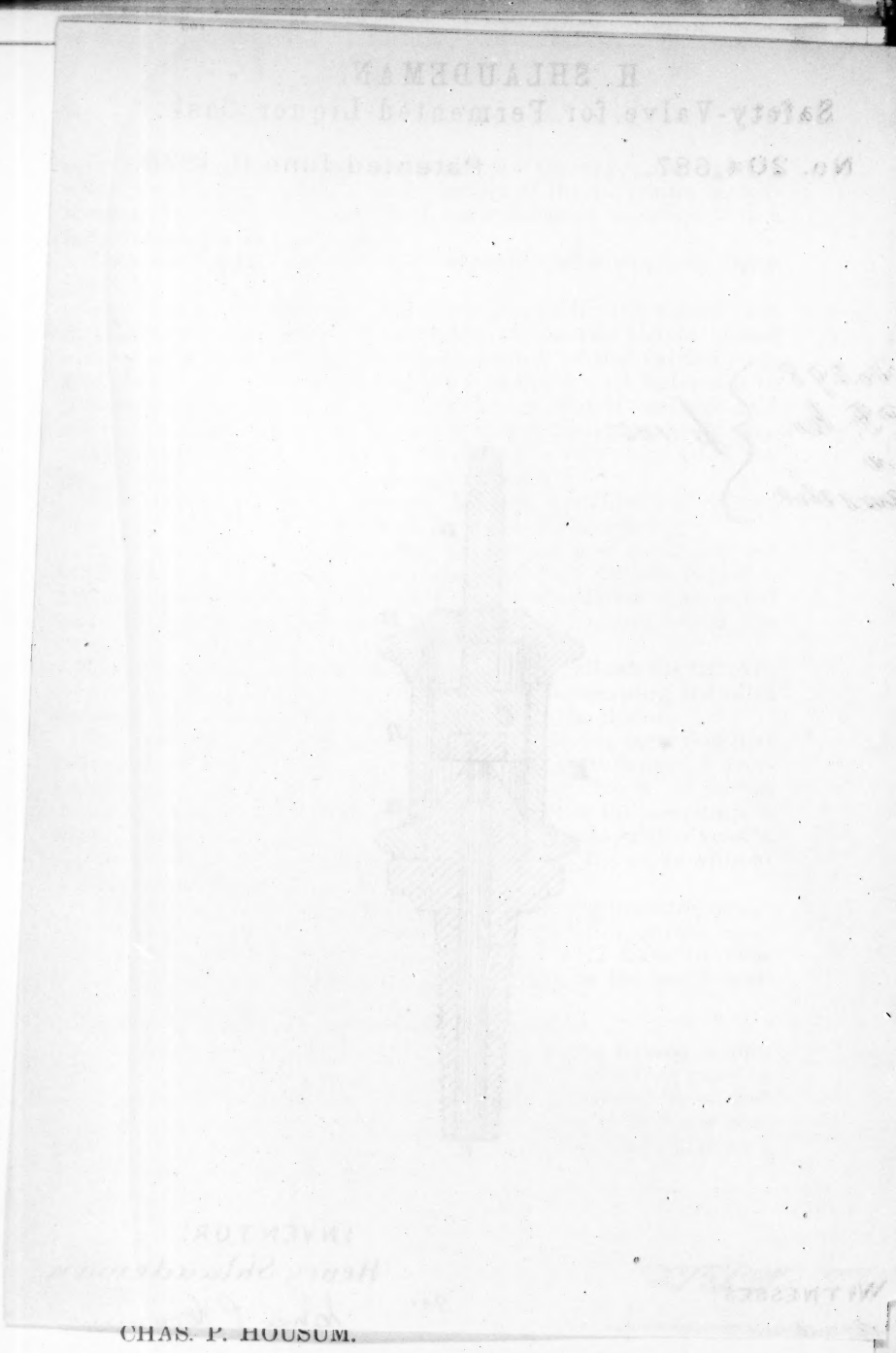
No. 204,687. Patented June 11, 1878.

No. 298.
N. P. F. Co.
v.
Marshal.
p. 105



WITNESSES:
Theo Coleman
Chas McFletcher

INVENTOR:
Henry Shlaudeman
per Chas P. Howson
Atty



CHAS. P. HOUSUM.

(Here follows diagram marked p. 105.)

106 No. 205,572, issued to John M. Pfaudler July 2, 1878, marked "Defendants' Exhibit Pfaudler Patent:"

UNITED STATES PATENT OFFICE.

JOHN M. PFAUDLER, of Rochester, New York.

Improvement in Apparatus for Regulating the Pressure in a Series of Fermenting-Vessels.

Specification forming part of Letters Patent No. 205,572, dated July 2, 1878; application filed June 8, 1878.

To all whom it may concern:

Be it known that I, John M. Pfaudler, of Rochester, in the county of Monroe and State of New York, have invented a new and improved pressure-regulator for fermenting liquids, of which the following is a specification:

Figure 1, sheet 1, represents a partly sectional front or side elevation of my improved pressure-regulator, the section being taken on the line *w w* of Fig. 4, sheet 2. Fig. 2, sheet 1, is a detail section of the check-valve in one of the section-pipes. Fig. 3, sheet 2, is an end elevation of the pressure-regulator, partly seen in section on the line *x x* of Fig. 1. Fig. 4 is a vertical cross-section of the same, taken on the line *y y* of Fig. 1.

Similar letters of reference indicate corresponding parts.

The invention has for its object to provide an effective apparatus for equalizing the pressure in a series of hogsheads or other vessels containing beer, wines, or other liquids in a state of fermentation, and for regulating the pressure of the gas caused by such fermentation so that it shall not exceed a certain number of pounds to the square inch, previously determined and gaged in the said apparatus.

The invention consists in the combination of one or more section-pipes, each having branch pipes connecting it with one or more fermentation-vessels, and a check-valve, and a stop-cock with a main pipe connected by branch pipes and stop-cocks to intercommunicating cylinders or receivers provided or connected with pressure-gage, safety-valve, and blow-off cocks, as will be hereinafter described and claimed.

A is one of the section-pipes, of which there are one or any number, according to the number of hogsheads or other vessels required to be in operation at the same time. The said vessels are arranged in sections of a certain number—say six—and each connected by a hose to one of the branch pipes B of their common section-pipe, A. The latter are attached to one common main pipe, E, and each of them is provided with a stop-cock, D, for shutting off communication with the main pipe E in case of leakage in the fermenting-vessels, or when attaching their hose to the pipes B, or for other purposes. Between the cock D and the pipe B nearest to it the section-pipe A is provided with a check-valve, C, which opens when the pressure in the fermenting-vessels preponderates, and allows the gas

(Here follows diagram marked p. 105.)

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UNITED STATES PATENT OFFICE.

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Similar letters of reference indicate corresponding parts.

The invention has for its object to provide an effective apparatus for equalizing the pressure in a series of hogsheads or other vessels containing beer, wines, or other liquids in a state of fermentation, and for regulating the pressure of the gas caused by such fermentation so that it shall not exceed a certain number of pounds to the square inch, previously determined and gaged in the said apparatus.

The invention consists in the combination of one or more section-pipes, each having branch pipes connecting it with one or more fermentation-vessels, and a check-valve, and a stop-cock with a main pipe connected by branch pipes and stop-cocks to intercommunicating cylinders or receivers provided or connected with pressure-gage, safety-valve, and blow-off cocks, as will be hereinafter described and claimed.

A is one of the section-pipes, of which there are one or any number, according to the number of hogsheads or other vessels required to be in operation at the same time. The said vessels are arranged in sections of a certain number—say six—and each connected by a hose to one of the branch pipes B of their common section-pipe, A. The latter are attached to one common main pipe, E, and each of them is provided with a stop-cock, D, for shutting off communication with the main pipe E in case of leakage in the fermenting-vessels, or when attaching their hose to the pipes B, or for other purposes. Between the cock D and the pipe B nearest to it the section-pipe A is provided with a check-valve, C, which opens when the pressure in the fermenting-vessels preponderates, and allows the gas

to pass off into the main pipe E, but closes in the opposite direction—that is, against a preponderating counter-pressure in the main pipe E. The main E carries off the surplus gas from the several sections to one or more cylinders or reservoirs, H, by means of one or more branch pipes, F, each of which is provided with a stop-cock, G. The cylinders H have blow-off cocks I at the bottom, which cocks may be connected to a common discharge-pipe, J, and opened to cleanse the cylinders of any sediments which may have been carried over into the cylinders by a sudden rush of gas from extraordinary fermentation in any of the sections.

Communication is kept up between the upper part of the cylinders H by the pipe K, which is connected by a pipe, L, having a stop-cock, M, to a manometer, N, or a pressure-gage, indicating in numbers of pounds to the square inch the pressure of the gas in the cylinders.

The pressure (generally five or six pounds) at which it is desired to carry on the fermentation is gaged and regulated by sliding the the weight O on the lever P of the safety-valve Q nearer to or farther from its fulcrum, to correspond with the position of the index of the manometer N at the number on the scale at which it is intended that the valve should open and let out the surplus gas.

The manometer N may be dispensed with, and the pressure adjusted and read off on a scale graduated upon the lever P directly. The safety-valve is attached on top of the cylinder; and to guard against overpressure in case of the valve getting out of order, two or more safety-valves are used, as shown in the drawing.

When using the two valves, Q, they are preferably connected together by a pipe, R, to discharge through a common exhaust-pipe, S. The fermentation-vessels of each section being all connected by hose to the branch pipes B, and by the latter to their common section-pipe, A, without intermediate valves, it is evident that
107 the pressure in them all is equalized by the free access of the gas from one to the other, thus preventing the liability of either of them to burst from overpressure; and when the gas has accumulated sufficiently to cause pressure in excess of that gaged the check-valve C will open and the surplus of gas pass to the main pipe E and thence to the cylinders H, where it is stored up until sufficient pressure is attained to raise the safety-valves Q and allow the surplus to escape through the exhaust R S.

By this invention the fermentation can thus be kept operating at a uniform pressure to insure beer of uniform quality, and the hogsheads or other vessels need not be subjected to any more strain than what is necessary to insure the said uniformity.

Having thus described my invention, I claim as new and desire to secure by letters patent—

The combination of one or more section-pipes, A, each having branch pipes, B, connecting it with one or more fermentation-vessels and the check-valve C and stop-cock D with the main pipe E, connected by branch pipe F and stop-cock G to the intercommunicating cylinders or receivers H, provided or connected with pressure-gage,

N, safety-valve Q, and blow-off cocks I, substantially as and for the purpose set forth.

JOHN M. PFAUDLER.

Witnesses:
JOHN M. KLINGLER.
STEPHEN C. MITCHELL.

(Here follows diagram marked pp. 108 & 109.)

110 UNITED STATES PATENT OFFICE.

THEODORE F. STRAUB, of Allegheny City, Pennsylvania.

Improvement in Vent-Cocks for Beer-Fermenting Casks.

Specification forming part of Letters Patent No. 208,771, dated October 8th, 1878; application filed September 6th, 1878.

To all whom it may concern:

Be it known that I, Theodore F. Straub, of Allegheny City, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful improvement in cock and vent for beer-casks, and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which—like letters indicating like parts—

Figure 1 shows, in elevation, my improved cock and vent for beer-casks. Fig. 2 is an enlarged vertical sectional view of the lower part of the U-shaped pipe or tube used in the apparatus. Fig. 3 is a like view of the funnel used at the outer end of the tube, and Fig. 4 is a reduced view, in elevation, of my improved apparatus as applied to a finishing cask.

My invention relates to a device adopted for use in the
111 manufacture of lager beer and other malt or fermented liquors, and the purpose of its use is to secure a constant and uniform pressure on the liquor being treated, whereby the gas generated during such treatment is allowed to escape, while the liquor itself is retained in the cask. Other useful results are also secured by its use, as will presently appear.

In the "finishing process," so called, of the manufacture of lager beer the liquor is drawn from the "stocking-cask" into what is known as a "finishing cask," and then charged with, say, from eight to ten per centum, by quantity, of freshly-fermented liquor. This charge causes a refermentation, or an additional fermentation or working in the contents of the cask, and it has been the custom to open the bung of the cask while this fermentation was going on and allow the gas generated to escape through it, but, in so escaping, the gas carries with it considerable liquor, which is wholly wasted, and hence it is necessary to add, from time to time, charges of fermented liquor to supply such waste and keep the cask well filled. When this action or fermentation has continued a proper time the cask is closed and allowed to stand for a time, and when the liquor

has attained a certain stage or condition it must be racked off at once, since, if it remain a longer time, it becomes muddy or deteriorated in quality.

Such method of treatment requires close attention not only to determine when this finishing operation should be arrested,
112 but also to keep the cask properly filled as the waste is carried off.

My improvement is designed to obviate the necessity of watching this operation so closely, as with it there is no wastage of liquor, and, therefore, no occasion for refilling, and there is little or no danger of the beer becoming injured or deteriorated in case it is not drawn or racked off at once upon attaining a certain stage or condition.

My improved apparatus is constructed as follows: A three-way cock, A, is provided, having any suitable means, as a threaded end, as shown in Fig. 1, for attaching it to the cask B. One passage or way in this cock is arranged to open into the cask B, one to a pipe, D, and one to a U-shaped pipe or tube, C C′. These three-ways are controlled by a rotating valve or plug, *a*, whereby the way leading into the cask may be opened to either the pipe D or the pipe C, or closed from both, at pleasure, as, for example, when the lever *c*, which operates the plug *a*, is in the position shown in full lines, Fig. 1, the way leading into the cask will be opened to the way leading to the pipe C and closed as to that leading to the pipe D. When the valve is moved so that this lever occupies the position shown in dotted lines at *c′*, communication will be opened from the cask through D and closed through C, and if for any cause it is
113 desired to close the way to the cask from both D and C it may be done by turning the plug *a* until the lever occupies the position shown in dotted lines at c^2.

The pipes or tubes D and C C′ may be made of any suitable material. I prefer, however, to use flexible hose, and they are connected to the cock A so as to open into or communicate with their respective ways by screw-couplings *s s*, or other suitable coupling devices, properly packed to secure a tight connection.

The pipe C C′ is made some ten or twelve feet in length, more or less, varying somewhat according to the degree of pressure required, and it is supported by any suitable means so as to assume a
114 U-form, as shown, the leg or part C′ being, by preference, about five feet in height, more or less.

In use, this pipe C C′ is charged with water until such water reaches to or nearly to the level of the upper surface of the liquor in the cask; or, in any case, sufficient water is used to fill the part C′ of the pipe. In order to facilitate this filling of the pipe, I attach a funnel, *e*, to its outer end; also the flaring mouth of such funnel facilitates the escape of gas from the pipe, as presently described.

At the lower part of the U formed by the pipe C C′, I make a short section, *b*, by preference of metal. The length of this section *b* is not material. I prefer, however, to let it include both elbows or curves of the U, so that the flexible tubes may hang nearly straight.

At one or both ends of the section or part *b*, I contract the passage to one or more small openings, *r*. This may be done by means of screw-plugs *r'*, fitted in the ends of the section, as shown, or in other convenient way.

The object in thus reducing the passage in the pipe is to arrest the unequal or explosive action of the gas as it escapes from the cask B and prevent it from forcing the water from the part C' by such sudden or irregular action. By thus reducing the passage at one or more points the gas will find its way through such openings in small quantities or volumes only, which will bubble up through the water in the part C', and escape at the funnel mouth *e* without agitating the water so as to force it from the pipe. For a like reason I also prefer to make a similar contraction at or near the lower point of the funnel *e*. This may be done, as shown in Fig. 3, where the desired contraction is made by means of a perforated plug, *e'*, secured in place in any convenient way.

The pipe D leads to any suitable air-compressing device, and it is used for conveying compressed air to the cask B, when its contents are racked off.

The operation of my improvement is as follows: The finishing cask B is filled with the liquor to be treated, the same being charged with the requisite amount of freshly-fermented liquor, as described. While this is being done the bung *o* is securely closed, and the cock A, with its attachments, is secured to the cask, so as to open into it at the top, or as near the bung as practicable. Sufficient water is charged into the pipe C C', by preference, to fill it to or nearly to the level of the top of the cask or the liquor therein. The plug *a* is turned, as shown in full lines at *c*, so as to open the way from the cask to the pipe C C', and the action or working of the contents of the cask is allowed to proceed. As gas is generated in such action it will pass from the cask through the cock A to the part C of the pipe, and as such gas accumulates its pressure will force the water in the pipe out of the part C into the leg or part C'. At this point the gas, being of less specific gravity than water, will escape upward through the water in the form of bubbles, and, owing to the contractions in the passage through the pipe, as described, the water in the part C' will not be forced out, though the pressure of the gas as it passes from the cask is subjected to sudden changes. In this way a constant and uniform pressure will be exerted on the contents of the cask, which pressure will be measured by the weight of the column of water in the pipe C'. By making this column of sufficient height, as described, the weight or pressure therefrom will be sufficient to prevent the liquor in the cask from escaping with the gas, and thus all waste from such cause is avoided; and, also, the liquor being at all times during such treatment under pressure, it is prevented from becoming muddy or deteriorated, though it be left in the finishing cask for some time after having come to the proper condition for racking off; and when it is desired to rack or draw off the finished beer the passage in the cock A is opened to the pipe D and closed as to C, as described, when air may be forced into the cask, as desired.

I do not limit myself to the particular location or locations shown and described for the contractions in the pipe C C′, as they may be placed at other parts of the pipe, and they may be made in other ways, and still perform the function described; and such modifications I consider as coming within my invention.

By the use of my improvement the beer, having been once properly finished, may be racked or drawn off for use, as convenience may require, and it will not, as in the old process, be injured or deteriorated by being left in the finishing cask.

I claim herein as my invention—

1. As an attachment to be applied to casks in the finishing operation a three-way cock, in combination with compressed-air pipe D and U-shaped water-pipe C C′, the latter having the reduced port or ports *r* at one or more points of its length, substantially as set forth.

2. The U-shaped water-pipe C C′, having a reduced port or ports, *r*, at one or more points of its length, in combination with a cock for use with a finishing cask, whereby a water column in one leg of the pipe will exert a constant and uniform pressure on the surface of the beer, while excess of gas is permitted to escape, substantially as set forth.

In testimony whereof I have hereunto set my hand.

THEODORE F. STRAUB.

Witnesses:

J. J. McCORMICK.

CLAUDIUS L. PARKER.

(Here follows diagram marked p. 115.)

116 No. 215,596, issued to Frank Fehr May 20, 1879, marked by examiner "Defendants' Exhibit Fehr Patent:"

UNITED STATES PATENT OFFICE.

FRANK FEHR, of Louisville, Kentucky.

Improvement in Apparatus for Regulating the Pressure in Beer Casks.

Specification forming part of Letters Patent No. 215,596, dated May 20, 1879; application filed March 18, 1879.

To all whom it may concern:

Be it known that I, Frank Fehr, of Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful improvements in apparatus for regulating the pressure of the carbonic acid in beer casks; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention has for its object the equalization of pressure of carbonic acid gas in beer casks when charged, and also the retention of

a sufficient supply of gas in the receiver for the charging of fresh casks, while at the same time any excess of gas in the receiver may be automatically discharged, all substantially in the manner hereinafter described; and with the above object in view my invention consists in the employment and arrangement of such devices as will be more specifically set forth in the claims.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawings, in which—

Figure 1 is a side view of my machine applied to a cask, and Figs. 2 and 3 are details of the same.

A represents a gasometer, with the movable receiver B, similar to those used in gas machines, the receiver being suspended by one or more cords or chains, *a*, passing over pulleys *b*, and having weights C at their ends.

On top of the receiver B is a gage, D, and a valve, F. This valve is opened by means of a lever, *d*, striking a stop, I, adjustable in the frame E of the gasometer.

From the gasometer A a pipe, *i*, connects with a pipe, J, which is to run the length of the cellar or vault, and this pipe is provided with a series of branch pipes, *h h*, for connection with the beer casks, the various pipes being provided with suitable stop-cocks.

When a number of beer casks are thus connected the carbonic acid gas generated therein rises through the pipes and passes into the receiver, which is to be set for a pressure of eight pounds, more or less. As the gas generates and enters the receiver this rises until this pressure is gained, where it remains, the excess of pressure being automatically allowed to escape by the valve F.

During the process of fermentation if the beer in one cask should generate more gas than another the gasometer equalizes the same, so that the amount and pressure of gas in all the casks will always be uniform.

Any one or more of the casks may be disconnected and other casks of new beer connected without in any way causing the beer in the other casks to deteriorate, because the receiver will at once fall and retain the same pressure of gas as before.

One of the main features of my invention is the storage of a sufficient quantity of the carbonic acid gas to supply new casks without drawing from those already undergoing fermentation.

Having thus fully described my invention, what I claim as new, and desire to secure by letters patent, is—

1. In an apparatus for charging and equalizing the pressure of carbonic acid gas in beer casks, the combination of vessel A and receiver B with the adjusting stop I and slotted graduated bar E, all arranged to operate substantially as and for the purpose set forth.

2. In an apparatus for charging and equalizing the pressure of carbonic acid gas in beer casks, the combination of vessel A, receiver B, valve F, lever *d*, and adjustable stop I, all as and for the same purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

FRANK FEHR.

Witnesses:
JOHN F. KELLNER,
JOHN HELMUS.

(Here follows diagram marked p. 117.)

118 The defendants also offer in evidence a translation from "Vorschule der Bierbrauerei," Part V, sec. 24, pages 357 and 358, as made by Frank A. Maus and referred to in the testimony of Henry Jameson, M. D., Q. 22 of the direct examination, and Q. 8 of the direct examination of Frank A. Maus, which is marked "Exhibit Translation," and is as follows, to wit:

DEFENDANT'S EXHIBIT TRANSLATION.

From Vorschule der Bierbrauerei, pages 357 and 358.

Part V.—Regulation of the carbonic acid.

"SECTION 24. Carbonic acid imparts valuable properties to the beer, and every brewer strives to charge his beer with a large amount thereof. Divers ways are used to attain this object.

"By 'bunging' the bung is driven in tightly, so that the carbonic acid formed by it after fermentation cannot escape and will dissolve in the beer. If the beer is held long enough in the bunged cask, it will show a fine head of foam when drawn off into a glass. Should it remain too long in a bunged cask (especially in the case of lager beer), a dangerous condition may be developed. By tapping such a cask the carbonic acid, by reason of the excessive amount of carbonic acid being developed, rises with great force, and may carry the yeast which has settled during the fermentation with it and make the beer turbid. In such a case the bung must be raised, and, after the excessive quantity of carbonic acid has escaped, be again driven in tightly.

"We must seek to better select the moment at which to withdraw the beer from the shavings cask. A gimlet-hole is bored into the head of such a cask, which is stopped up by means of a small wooden tap. From time to time this small tap is withdrawn, and the pressure in the cash is shown by the distance or arch described by the escaping beer. The farther one can catch the escaping beer from the cask the greater the pressure in the cask.

"The beer is tapped and tried until the escaping beer reaches the necessary carrying force. These trials are usually long, and often serve as a cloak to cover much beer-drinking in the cellar.

"For these reasons I have constructed a vent-bung, which is a sure and simple regulator of the pressure of the carbonic acid. Fig. 110 gives in A a side view, in B a top view of the bung. The head has a flat groove, *a a*. In the center of the bung an air-hole, *b b*, is bored, and around the bung the groove *c c* is cut. Over the open-

"EXHIBIT—CIRCULAR."

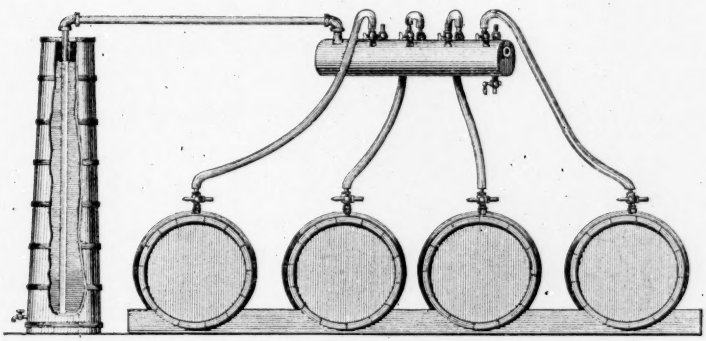
THE WALLACE IMPROVED FERMENTATION CO.

INDIANAPOLIS, ———, 188 .

DEAR SIR:

We beg to submit for your consideration a description of the

WALLACE



AUTOMATIC BUNGING APPARATUS

FOR REGULATING THE PRESSURE ON

BEER OR OTHER LIQUIDS

During their Fermentation in Closed Casks or Vats.

The most essential part of the apparatus, namely, the use of a water column connected with a closed vat or cask of fermenting Beer, was invented by Mr. George Wallace, who obtained a patent for his invention March 5th, 1867. (No. 62,581.)

THE WALLACE IMPROVED AUTOMATIC BUNGING APPARATUS,

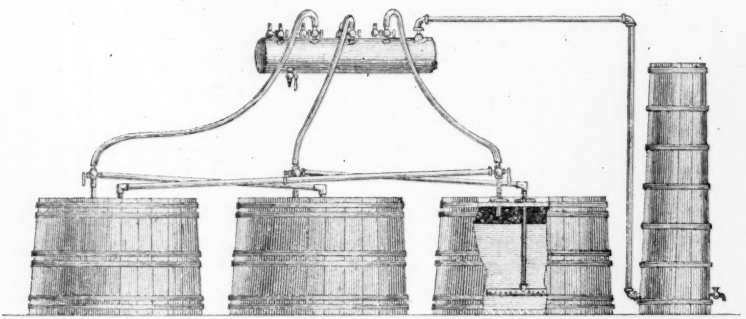
as shown in the drawings, consists of one or more pipes attached to the tops of a corresponding number of vats or casks, and leading into the top of a galvanized iron cylinder, from which a single pipe proceeds, and enters a column of water in which it discharges near the base of the column. The height of the water in the column is regulated by the brewer according the pressure he desires to have on his beer.

The cylinder is indispensable to the successful work of any bunging apparatus and gives the following advantages:

1st. The foam and condensable gases rising from the beer are retained in it and can be drawn off by means of a small cock at the lower side of the cylinder, only the carbonic acid gas is expelled through the water, thus keeping the water always sweet and fresh.

2d. No cask can be filled too full, as all surplus is carried to the cylinder where it can be withdrawn. It cannot flow into other casks or into the water column.

3d. The Hop Resin and other soluble matter that rises to the top of the Beer during fermentation are carried into the cylinder and withdrawn. All other bunging apparatuses leave them to sink back through the beer and thus retard clarification.



The whole apparatus is simple in its construction and necessarily very durable; it is easily understood and managed. The tubes are easily disconnected and cleaned. It has no springs or valves, therefor it cannot clog, which makes it the most reliable Bunging Apparatus in use.

After the Kraeusen and Fining are added to the beer in the fining casks, the apparatus may be attached at once. The casks will need no further refilling, thereby causing a saving to the brewer.

The Wallace Improved Fermentation Company owns the patents under which this apparatus is made, and will enforce its rights against all who use their apparatus or parts of it without the consent of the Company.

For prices or further particulars, address—

THE WALLACE FERMENTATION CO.,
N. W. Cor. of Agnes and New York Sts.,
Indianapolis, Indiana.

ing *b* in the flat groove *a a* a ribbon like a piece of elastic rubber is drawn, and both its ends are held or drawn tight until, by means of a waxed string, they are tied in the groove *c c*. Thus the vent-bung is ready.

"If we blow into the opening *b'* at the under side of the bung, the rubber band at *b*, on top, will raise, and the pressed air will escape with a loud report. If, however, we suck at *b'*, the rubber band will lay tightly over *b* and no air can enter from without.

"We see that one has, by greater or less tension of the rubber band before tying, the power to give it greater or less resisting force. The vent-bung will act in just the same way when placed in a cask. When the carbonic acid has reached a certain pressure, the rubber band will rise and the surplus will escape. Then the vent will close itself, until, through the continued fermentation, the collection of carbonic acid becomes again excessive. The tighter the ten-
119 sion of the rubber band is, the greater will be the amount of pressure necessary to lift it, or a larger amount of carbonic acid must be at hand, and consequently the beer will be more sparkling."

The above is a true translation of section 24, pages 357 and 358, of a German book entitled "Vorschule der Bierbrauerei," as referred to in my testimony.

FRANK A. MAUS.

The defendants also offer in evidence the circular of the Wallace Improved Fermentation Company produced by Frank A. Maus, and referred to in question 4 and answer of his cross-examination, which is marked "Exhibit Circular," and is as follows, to wit:

(Here follows diagrams marked pages 119*a* and 119*b*.)

120 Counsel for complainant consents and agrees that printed copies of the specifications and drawings of each of the patents above offered in evidence, as furnished by the Patent Office, may be used the same as the original patents or duly certified copies thereof.

Counsel for the defendants now notify the counsel for the complainants that, to sustain certain averments in the answer, they desire to prove and offer in evidence certified copies of the application of Philip Geyer, of Rahway, New Jersey, for letters patent for an apparatus involving substantially the same invention claimed in the Meller & Hofmann patent, which they are informed has been assigned to George Bartholomae, either for himself or in trust for the complainants, and which is now held pending in the United States Patent Office, and which, under the rules of the Patent Office, they are unable to obtain without the consent of the assignee or assignees thereof; and they ask consent and direction to the Commissioner of Patents to furnish defendants a certified copy thereof for such purpose.

That they also desire to procure and offer in evidence a certified copy of the application for a reissue of the letters patent, No. 63636,

issued to Thomas R. Hicks, and assigned to Otto Zweitusch, which application was rejected, and they ask the consent of the plaintiffs that the Commissioner of Patents may furnish the defendants a certified copy thereof for such purpose.

Adjourned to Monday, March 27, 1882.

Examination of FRANK A. MAUS, recalled by the defendants.

The complainant was not present, by attorney or otherwise.
Present: C. P. Jacobs, Esq., of counsel for defendants.

FRANK A MAUS, recalled, having been first duly sworn to testify the truth, the whole truth, and nothing but the truth, relating to said cause, deposes as follows:

Examined by C. P. JACOBS, Esq.:

Q. 1. Have you examined a book printed in German, at Brunswick, in the year 1854, by P. Müller, and entitled "Handbuch für Bierbrauer?" And, if so, please produce the same and make a translation of the first part of section 3, as found on page 225, and make such translation a part of your answer hereto.

A. I have examined said book, and herewith produce the same. I have made a translation of said part of section 3, and the same reads and is correctly translated as follows:

"After the prepared stock yeast has been added to the wort, there will form, after twenty or twenty-four hours, a circle of white foam on the surface of the beer near the sides of the vat, which gradually increases itself, and after twelve or fifteen hours further the whole surface is covered with a delicate white covering. From the bottom of the vat countless small air-cells rise, which, on reaching the surface, burst with a peculiar hissing noise, and make the wort turbid. The foam covering grows higher and uneven; some matter is separated thereby (by fermentation), some of which falls to the bottom, and other parts are carried by the cells of carbonic acid gas to the surface, where at last the form curl-like gekraüselte, or curly elevations. 'The beer stands in kraüsen,' which will now assume a brown color and merge into each other."

Q. 2. Please examine the answer of General Sturm to the first question on re-examination, and state what stage of fermentation of lager beer it is that he has there described.

— I have read the answer referred to, and as he describes it, by the passing over of foam, as he states, it indicates that the beer in the casks, to which he applied his apparatus, was while the beer was in the shavings casks, or in the last stage of fermentation.

FRANK A. MAUS.

121 UNITED STATES OF AMERICA, *District of Indiana:*

I, Eugene G. Kreider, a special examiner in chancery in this cause, hereby certify that the above-named Henry Jameson, M. D., Jacob W. Loeper, Frank A. Maus, George Wallace, Mathias A. Maus, Clement A. Maus, and Herman Sturm were by me first duly sworn

according to law to testify the truth, the whole truth, and nothing but the truth relating to said cause; that their depositions were reduced to writing by me; that the said New Process Fermentation Company was represented by its attorney, Ephraim Banning, Esq., except at the examination of Frank A. Maus, recalled; that said depositions were taken at the office of Duncan, Smith & Duncan, No. 76 East Washington street, in the city of Indianapolis, county of Marion, and State of Indiana. The depositions of Henry Jameson, M. D., Jacob W. Loeper, Frank A. Maus, George Wallace, and Mathias A. Maus were taken on the 21st, 22d, and 23d days of February, 1882. The depositions of Clement A. Maus and Herman Sturm were taken on the 24th day of March, 1882, and the deposition of Frank A. Maus, recalled, was taken on the 27th day of March, 1882.

In testimony whereof I have hereunto set my hand and seal this 27th day of March, 1882.

[SEAL.] EUGENE G. KREIDER,
Special Examiner.

Circuit Court of the United States, District of Indiana. In Equity.

NEW PROCESS FERMENTATION COMPANY
vs.
MAGDALENA MAUS *et al.*

It is hereby stipulated that the complainant shall have until the first day of October, 1882, for taking her rebutting testimony, and that it will close the taking of such evidence by that time.

It is also stipulated that the defendants may offer and use on the hearing certified copies of the record of the application for a reissue of letters patent granted to Thomas R. Hicks in 1867 for a ventbung, and also of the application of C. A. Maus for letters patent, both of which have been referred to in the defendants' evidence.

Dated, August 14, 1882.

BANNING & BANNING,
Solicitors for Complainant.
C. P. JACOBS,
Of Counsel for Defendants.

Petition.

Application of Clement A. Maus. Filed July 20, 1878.

To the Commissioner of Patents:

Your petitioner, a resident of the city of Nashville, State of Tennessee, prays that letters patent may be granted to him for the invention set forth in the annexed specification; and he hereby appoints John E. Bauman, of the city of Nashville, State of Tennessee, his attorney, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent Office connected therewith.

CLEMENT A. MAUS.

122 NASHVILLE, *July* 25, 1878.

To the Commissioner of Patents, Washington, D. C.

SIR: Enclosed we respectfully return the corrected specification in the application of Clement A. Maus for an improvement in "apparatus for controlling and keeping at any desired pressure liquids undergoing fermentation by means of a water pressure." We trust that, as corrected, the specification will be found all right, etc.

Very respectfully, JOHN E. BAUMAN,
No. 90 S. Cherry Street, Nashville, Tenn.

Specifications,

Erase per amended specification "A."

Describing an apparatus for controlling and keeping at any desired uniform pressure liquids undergoing fermentation by means of a water pressure. Invented by Clement A. Maus, of Nashville, State of Tennessee.

The object of my invention is to keep a permanent and uniform pressure on any kind of liquids undergoing fermentation for the purpose of fining or ripening the same, and placing it completely under the control of the attendant to increase or diminish the pressure without in the least disturbing the working of the liquid, as is more fully illustrated in the accompanying drawing and model.

The drawing is an elevation of the apparatus, in which A is an air chamber or vessel in which is confined atmospheric air, on which the pressure of a column of water of the requisite height to produce any desired pressure is brought to act, through the medium of the reservoir C and the pipe B, by compressing the air in the chamber A, and transmitting said pressure through the pipe F on the liquid working in the cask or vessel G, and steadily and uniformly keeping the pressure both in the air-chamber A and the cask G at the pressure that is due to the height of the head of water in the reservoir C. Should the liquid in the cask G undergoing fermentation at any time generate a greater pressure than is due to the head of water in the reservoir C, the gases will force their way through the pipe F, air-chamber A, and the pipe B and reservoir C, and waste through the water in the reservoir C, until the pressure is reduced to the standard pressure due to the height of the column of water operating. The air-chamber can be connected with an air-pump through the medium of the pipe and cock E, so that in the event of the absorption of the charge of air in the air-chamber A, by being kept under a steady high pressure, it can be refilled with air when necessary, and by this means the air-chamber can be recharged without disturbing the head of water. When it becomes necessary to empty the machine of its water charge, it can be done by means of the pipe and cock D.

I can apply my invention to beer on draught simply by using the apparatus described, and adjusting the head of the water to produce the pressure under which the keg of beer has been filled, and by

this means I maintain a uniform pressure in the keg as the beer is drawn out, and prevent the contents from becoming stale, and the last beer is as lively as the first drawn from the keg when full.

My invention can also be applied to reduce the temperature of water and other liquids by using my apparatus in pairs, and making them work automatically and discharge the charges of compressed air alternately through coils of pipe immersed in a liquid to be reduced in temperature, and the reduction in temperature of the liquids is only limited by the head of water that can be obtained, under which the compression acts.

123 Having thus fully described my apparatus and its operations, I claim as my invention the combination of the air-chamber A, water-pipe B, and reservoir C, pressure-pipe F, and vessel G, substantially and for the purposes specified.

CLEMENT A. MAUS.

Witnesses:
JOHN E. BAUMAN.
J. V. PETTY.

STATE OF TENNESSEE, }
County of Davidson, } ss:

Clement A. Maus, the above-named petitioner, being duly sworn, deposes and says that he verily believes himself to be the original and first inventor of the improvement in water-pressure apparatus described and claimed in the foregoing specifications; that he does not know and does not believe that the same was ever before known or used, and that he is a citizen of the United States and a resident of Nashville, Tenn.

CLEMENT A. MAUS.

Sworn to and subscribed before me this 17th day of July, 1878.
F. D. CASSETTY,
Justice of the Peace, Davidson County, Tenn., at Nashville.

(27364. Room 151.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C., *July* 31, 1878.

Pressure apparatus for beer. Filed July 30, 1878.

Clement A. Maus, care John E. Bauman, 90 S. Cherry street, Nashville, Tenn.:

This application is found to be fully anticipated in the patents to Dietrichsen, May 25, 1869, 90349, and Eichemeyer, September 22, 1868, 82394 (preserving beer and wine).

The sentence ending with "reservoir C," line 8, page 2, of the specification is vague and incomplete.

R. G. DYRENFORTH, *Examiner.*

To the Commissioner of Patents:

The undersigned having, on or about the 30th day of July, 1878, appointed John E. Bauman, of Nashville, Tennessee, Davidson county, his attorney, to prosecute an application for letters patent, which application was filed on the 20th day of July, 1878, for an improvement in "pressure apparatus for beer," hereby revokes the power of attorney then given, and hereby appoints Erastus O. Frink, of Indianapolis, in the county of Marion and State of Indiana, his attorney, with full power of substitution and revocation, to prosecute said application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent Office connected therewith.

Signed at Indianapolis, in the county of Marion and State of Indiana, this 30th day of January, 1880.

CLEMENT A. MAUS.

(Room 151.)

In the Matter of the Application of CLEMENT A. MAUS for letters patent for improvement in pressure apparatus for beer. Filed July 30, 1878.

124 INDIANAPOLIS, *May* 27, 1880.

To the Commissioner of Patents:

SIR: In the above-mentioned application, the office letter of July 31, 1878, is before me and contents noted. The references cited—those of Dietrichsen, May 25, 1869, and Eichemeyer, September 22, 1868—have also been carefully examined.

The original specification in the above-mentioned case is defective—that is, the description of the invention is not clearly set forth.

I hereby amend said specification by striking it all out, except signatures, and in lieu thereof will submit the annexed amended specification and claim for consideration.

Yours respectfully,

E. O. FRINK,
Attorney for Applicant.

To all whom it may concern:

Amended specification "A."

Be it known that I, Clement A. Maus, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful beer-pressure apparatus, of which the following is a specification:

My invention relates to an apparatus for producing and maintaining a uniform pressure on any kind of liquids while undergoing fermentation, in which a receiver containing water and air, and having a stand-pipe attached thereto, also a pipe connection with a cask or vessel, operates in conjunction with the gases generated in a cask or vessel; and the object of my improvement is to keep a permanent and uniform pressure on the fermenting liquid contents

of a vessel, for the purpose of fining or ripening the same and placing it completely under the control of the attendant, who may increase or diminish the pressure without disturbing the working of the liquid.

This object I accomplish by the mechanism illustrated in the accompanying drawing, in which the entire invention is represented by a single figure.

A represents an air-tight chamber or reservoir, having a vertical stand-pipe, B, inserted in one head near the bottom, and a discharge-pipe, D, with a cock, also at the bottom.

The upper side of the chamber is provided with another pipe, E, also provided with a cock for the purpose of inserting water into the chamber A, or for the purpose of conducting air under pressure inside of the chamber.

Near one end of the chamber A is inserted another pipe, F, also provided with a cock, as shown. The pipe F may be of any material, and a flexible pipe is preferred. The upper end of this pipe F is inserted in the cask or vessel G, or attached to any suitable connection made fast to the vessel.

The chamber A contains water and air, and the cask or vessel G contains liquid undergoing fermentation.

The gases generated in the vessel G during the fermentation of the liquid are forced through the pipe F into the space above the water into the chamber A, thus equalizing the pressure in the vessel G and chamber A. As the pressure on the water in the chamber A increases the water is forced up the stand-pipe B. This column of water exerts a counter-pressure on the gases contained in the vessel and chamber, the amount of this counter-pressure being regulated by the height of the water in the pipe B. When the water in the chamber A has been forced to rise in the pipe B far enough to permit gases also to enter said pipe, then the pressure is regular, all surplus gas passing out through the pipe B, while the uniform pressure is maintained on the gas by the weight of the water in the column.

If a greater pressure is required more water can be poured
125 into the pipe B. If a less pressure or a change of water is required, then it can be drawn off through the pipe D. As the pressure of the gas becomes less then the water falls in the pipe B, and the height of the water in said pipe indicates the pressure inside.

What I claim as new, and desire to secure by letters patent, is—

Erase and insert "B."

The air and water chamber A, having a stand-pipe, B, and discharge-pipe D attached close to the bottom thereof and provided with a pipe, F, with a cock leading out of the top of the chamber into a cask or vessel, G, combined with the vessel G, and the water contained in the chamber A, whereby the gases generated from any liquid contained in the vessel while undergoing fermentation will produce pressure on and cause the water in the chamber to rise in the stand-pipe until the gas begins to escape through the stand-pipe, thus permitting all surplus gas to pass out through the water

in the stand-pipe, while the pressure is regulated by the column of water in the pipe, substantially as shown and described.

(Room No. 151. 27364.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C., *June* 12, 1880.

Apparatus for controlling pressure on liquids. Filed July 30, 1878.

Clement A. Maus, care E. O. Frink, Indianapolis, Ind.:

The amended claim is to a mere aggregation of parts. The references heretofore cited fully anticipate this application. The claim is rejected.

R. G. DYRENFORTH, *Examiner.*

(Room No. 151.)

In the Matter of the Application of CLEMENT A. MAUS for letters patent for improvement in apparatus for controlling pressure on liquids. Filed July 30, 1878.

INDIANAPOLIS, *July* 27, 1880.

SIR: In the above-mentioned application I hereby amend as follows:

Strike out the claim presented in the amendment of May 27, 1880, and in lieu thereof insert the following claim, to wit:

"B." In an apparatus for controlling pressure on liquids, the air and water tight chamber or reservoir A, containing water and having a vertical stand-pipe, B, open at its top; also having a discharge-pipe D, combined with the pipe F, and cask or vessel G, as described, for the purpose specified.

In regard to the references formally cited, the patent No. 82394, to Rudolph Eickemeyer, is for an apparatus for preserving beer, ale, etc., and is not an apparatus for controlling the pressure on liquids. Again, Eickemeyer's patent does not show, describe, or suggest an air and water tight chamber adapted to hold water and provided with a stand-pipe which is open at its upper end to receive and hold a column of water, which is forced out of the chamber A by the pressure of gas on the water in said chamber, and thus regulate the pressure on the liquid in a cask or vessel. Again, the construction and arrangement of devices, as disclosed by Eickemeyer's patent, are entirely different from those disclosed by applicant's devices. Eickemeyer's device is the combination of a vessel containing beer with a carbonic acid gas generating apparatus or reservoir, whereby the beer contained in said vessel is kept constantly charged with the carbonic acid gas, in a regular and automatic manner, as rapidly as said contents absorb the gas. This device also shows, de-
126 scribes, and claims an upper acid reservoir, B, and a lower gas-generator, C, in connection with the beer-containing vessel; also, the same with a washer.

The most diligent search through applicant's device fails to disclose any such constructed, arranged devices, and the reference—that of Eickemeyer—ought to be withdrawn as not meeting applicant's claims.

In regard to the second reference cited—that of William Dietrichsen, No. 90349—it also is a device for preserving beer and not a device for controlling the pressure on liquids, as in applicant's device.

Dietrichsen's device consists of the construction of two chambers or vessels, which are connected together by a pipe or pipes provided with suitable cocks, and also provided with escape-pipes, the whole being combined and arranged to turn on its axis, and operating in the manner and for the purpose described.

This reference is subject to the same argument as that of Eickemeyer's—nothing of the kind to be found in applicant's device. Applicant has no two chambers or vessels connected together with pipes and cocks and provided with escape-pipes, and the whole device arranged on pivots to be turned around, so as first to present one chamber or vessel above and the other below and then to reverse them. This reference ought to be withdrawn as not meeting applicant's invention or claim. Both the references cited are exclusively used for preserving finished beer on draught for consumption by supplying pressed air to the keg or barrel, as its contents are drawn off from their reservoirs of pressed air, while applicant's device is used for maintaining and indicating a uniform pressure by relieving the surplus pressure of the unfinished beer while undergoing fermentation.

The foregoing is respectfully submitted for consideration by—

E. O. FRINK,
Attorney for Applicant.

To the honorable the Commissioner of Patents, Washington, D. C.

(Room No. 151. 27364.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C., *Sept.* 16, 1880.

Apparatus for controlling pressure on liquids, etc., Filed July 30, 1878.

Clement A. Maus, care Erastus O. Frink, Indianapolis, Ind.:

The present claim embraces substantially the same parts as that first filed, and it is finally rejected upon the references cited.

J. H. WHITAKER,
Assistant Examiner in Charge.

(Room No. 151.)

In the Matter of the Application of CLEMENT A. MAUS for letters patent for improvement in apparatus for controlling a uniform pressure on liquids. No. 27364. Filed July 30, 1878.

INDIANAPOLIS, *Oct.* 15, 1880.

SIR: In the above-mentioned application the office letter of September 16, 1880, is before me and noted.

127 I hereby amend by striking out the claim presented in the amendment of July 27, 1880, and in lieu thereof will present the following claim for consideration, to wit:

In an apparatus for controlling a uniform pressure on liquids the air and water tight receptacle A, having a vertical stand-pipe, B, entering the base of the receptacle A, and open at its top to permit an inspection of the height of water therein, combined with the pipe F and cask or vessel G, in the manner described, for the purpose specified.

In argument I will state that the arrangement and combination of elements as set forth in the amended claim here presented are not to be found in the references cited.

If the examiner will point out in the references cited the same elements arranged to produce the result produced by applicant's invention, then applicant will not insist upon the claim being allowed; but, in the absence of any such showing, the amended claim is believed to be in condition to be allowed, because the result produced by applicant's device is different from that produced by the devices shown in the references, and the different result produced necessarily requires a different apparatus to produce it.

The receptacle A in applicant's device is simply a receptacle for the contents of the stand-pipe B in case the pressure in the cask G is reduced from any cause. Therefore the stand-pipe, by being open at the top, enables the operator to look into it from above and see at once any change in the pressure in the cask by the height of water in said pipe. This result cannot be accomplished by the devices shown and described in the references cited, because the stand-pipes, if any are there shown, are either closed at the top by a chamber or bent so as to prevent an inspection of the height of the water contained therein.

Respectfully submitted by—

E. O. FRINK,
Attorney for Applicant.

To the honorable the Commissioner of Patents, Washington, D. C.

(Room No. 151.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C., *Dec.* 7, 1880.

Apparatus for controlling and keeping, at any desired uniform pressure, liquids undergoing fermentation. Filed July 30, 1878.

Clement A. Maus, care Erastus O. Frink, Indianapolis, Ind.:

This application, having been twice rejected upon references, is in condition for appeal to the board of examiners-in-chief. It is not shown that the claim now offered differs in substance from those heretofore presented, and the examiner in charge must, therefore, decline to enter the same, in accordance with rule 67, office rules.

GEORGE P. FISHER, JR.,
Acting Examiner.

(1878. No. 27364.)

CLEMENT A. MAUS, of Nashville, county of ——, State of Tennessee.

Apparatus for controlling and keeping, at any desired uniform pressure, liquids undergoing fermentation.

Received July 19, 1878.
Petition, July 20, 1878.
Affidavit, July 30, 1878.
Specification, July 30, 1878.
Drawing, July 20, 1878.
Model, July 20, 1878.
128 Cert. dep.
Cash, $15, July 19, 1878.
Add'l fee cert.
Add'l fee, cash.
2. Examined.
Issue.
Patented —— —, 187–.
3. Circular.
Erastus O. Frink, Indianapolis, Ind.

(1878—Contents.)

Application papers.

1. Application.
2. July 31, 1878. Rejection.
3. Feb. 2, 1880. Power of att'y.
4. June 9, 1880. Am'd'd spec'n "A."
5. June 12, 1880. Rejection.
6. August 3, 1880. Am'd't "B."
7. Sept. 16, 1880. Rejection I.
8. Dec. 6, 1880. Am'd't (not entered).
9. Dec. 7, 1880. Letter.

Ex'd: H. M. H. Title.
E. A. M. Improvement in.

(2—175.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the files of this office of the file-wrapper and contents in the matter of the application for the reissue of letters patent granted Thomas R. Hicks April 9, 1867, No. 63,636, for improvement in vent-plugs.

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this ninth day of May, in the year of our Lord one thousand eight hundred and eighty-two, and of the Independence of the United States the one hundred and sixth.

[SEAL.] E. M. MARBLE,
Commissioner.

Petition.

To the Commissioner of Patents:

Your petitioner, of New Britain, Connecticut, prays that he may be allowed to surrender the letters patent for an improved vent-plug granted to him April 9, 1867, whereof Otto Zwietusch, on whose behalf and with whose consent this application is made, is now sole owner, by assignment, and that letters patent may be reissued to the said Otto Zwietusch for the same invention upon the annexed amended specification.

Accompanying this is an abstract of title, duly certified, as required in such cases.

He hereby appoints A. H. Evans & Co., of Washington, D. C., his sole and lawful attorneys.

THOMAS R. HICKS.

The undersigned, who is the assignee of the entire interest in the above-mentioned letters patent, hereby assents to this application.

OTTO ZWIETUSCH.

129 *Specification.*

To all whom it may concern:

Be it known that Thomas R. Hicks, of New Britain, county of Hartford and State of Connecticut, has invented certain new and useful improvements in treating fermenting liquors and in vent-plugs, which, he verily believes, has not been known or used prior to his application for a patent, and, to enable others skilled in the art to make and use the same, will proceed to describe by referring to the drawings, in which the same letters indicate like parts in each of the figures.

The nature of this improvement will be understood from the specification and drawings.

Substitute "A." Dec. 17, 1878. (The object desired to be obtained thereby is to provide a good, efficient vent-plug for vessels designed for holding beer and other fermenting

liquors and to render them air-tight, and at the same time to prevent them from bursting; in other words, to provide a vent-plug specially adapted to give relief under pressure, etc.) In the accompanying drawings—

Fig. 1 is an outside view.

Fig. 2 is a sectional side view.

Fig. 3 is a side view of a modification thereof.

Fig. 4 is a sectional side view of the same.

In figures 1 and 2, *a* is a stopper, which is driven or screwed into a vessel by means of a nut formation, *b*. Through this plug is formed an orifice, in the upper end of which is fitted a thumb-screw, *c*. Inside of the inner end of this thumb-screw is fitted a valve-stem, *d*. Inside of this thumb-screw and around the valve-stem is arranged a spring, *e*, which acts to depress the valve *g* down upon the valve-seat, *h*; *i* is a vent-hole. Now, when the pressure from the inside is greater than that of the spring *e* upon the valve *g* it (the valve) will be lifted thereby, and the gases, or whatever causes the internal pressure, are allowed to escape until checked by the resistance of the spring-valve; and whenever it may be desirable to increase or diminish the pressure of the valve it is only necessary to turn the thumb-screw in or out of the plug *a*. In figures 3 and 4 a chamber is formed from the upper end of the plug down through the centre and near to the bottom, and then a smaller hole is formed through the end thereof; *n* is a press-rod, having a pad, *n'*. This rod is made smaller just below the under side of the pad, and extends through the lower end of the plug, and has a valve, *o*, secured to its outer end, which is designed to bear against the end of the plug by the action of the spring *e*, which is placed upon the spindle of the press-rod, one end of which bears against a shoulder on the rod, and the other against the lower end of the plug-chamber to hold the valve *o* firmly against its seat on the lower or outer end of the plug. This is particularly adapted and designed for drawing liquors which are kept in air-tight vessels, in the use of which, by simply opening the faucet through which the liquor is drawn, and at the same time press-down the pad *n'* of the plug, the liquor will freely flow therefrom; and when the faucet is closed and the hand removed from the plug the vessel again becomes air-tight. Thus I am enabled to produce a good, cheap, and efficient vent-plug for all air-tight vessels.

I believe I have thus shown the nature, construction, operation, and advantages to be derived therefrom, so as to enable others skilled in the art to make and use the same therefrom.

What I claim, therefore, and desire to secure by letters patent, is—

Erased Dec. 17, 1878. 1st. As a new article of manufacture, a spring-pressure vent-plug, constructed substantially as and for the purpose described.

130 2d. The method herein described of giving beer a prede-

termined and continued pressure while under process of fermentation, by an automatic relief discharge of pressure from the cask, substantially as specified.

Substitute "B." Dec. 18, 1878.

3d. The method herein described of treating fermenting liquors, consisting in the application to a cask or casks of a valve constructed to open and give relief automatically by a predetermined pressure, which is generated by the liquid contained in the cask, substantially as specified.

4th. A vent-plug for casks having a predetermined discharge capacity, from which the relief discharge is caused by the self-generated pressure formed in a cask by means of fermentation of the liquid contained therein.

Erased Dec. 17, 1878.

5th. As a new article of manufacture, a safety-valve for casks capable of having a predetermined and equal capacity for retaining and allowing gas to escape, substantially as specified.

6th. A vent-plug for fermenting casks (having an automatic relief discharge), which is capable of being regulated to increase or diminish the pressure in the cask at will, substantially as and for the purposes set forth.

THOMAS R. HICKS, *Inventor.*

Witnesses:
P. J. MARKLEY,
LYMAN S. BURR.

Oath.

STATE OF CONNECTICUT, *County of Hartford,* } *ss:*

Thomas R. Hicks, the above-named petitioner, being duly sworn, deposes and says that he verily believes that, by reason of an insufficient or defective specification, his aforesaid letters patent are inoperative or invalid; that the said error has arisen from inadvertence, accident, or mistake and without any fraudulent or deceptive intention, to the best of his knowledge and belief; that Otto Zwietusch is the sole owner of said letters patent, and that this application is made on the behalf and with the consent of said Otto Zwietusch, and that he verily believes himself to be the first and original inventor of the improvement set forth and claimed in this amended specification.

THOMAS R. HICKS.

Sworn to and subscribed before me this 25th day of November, A. D. 1878.

[SEAL.]

LYMAN S. BURR,
Notary Public.

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the digest of this office of all assignments, agreements, licenses, powers of attorney, and other instruments of writing found of record under or

relating to letters patent granted to Thomas R. Hicks, April 9, 1867, No. 63636, for "vent-plug."

In testimony whereof I, W. H. Doolittle, acting Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed this second day of December, in the year of our Lord one thousand eight hundred and seventy-eight, and of the Independence of the United States the one hundred and third.

[SEAL.] W. H. DOOLITTLE,
Acting Commissioner.

131 (2—173.)

Assignors.	Assignees.	Date of assignment.	Date of record.	Invention.	Territory assigned.	Liber.	Page.
Thos. R. Hicks and E. Kempshall.	Otto Zwietusch, of Milwaukee, Wis.	1878. Nov. 7	1878. Nov. 15	Vent-plug. Apr. 9, 1867. No. 63636.	All their right, title, and interest in said invention and letters patent therefor, and also agree to sign any necessary papers for obtaining reissue of the same.	P. 23	65

(Room No. 103.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C., *Dec.* 13, 1878.

13320. Vent-plugs. Reissue, December 6, 1878.

Thomas R. Hicks, care A. H. Evans & Co., present:

The following new matter appears in this case and should be removed: "Beer and other," p. 1, l. 21; the second claim entire, there being no method for giving beer a predetermined and continued pressure, etc., suggested in the original patent; all statements in the claims about there having been a predetermined pressure. Under this head the following claims contain new matter: The second, the third, the fourth, and the fifth, and all statements that applicant's invention consists in treating liquors. Under this head the second and the third claims contain new matter.

The first claim is rejected on each of the following patents: Handy & Parkinson, 21535, September 14, 1858, steam safety-valves; T. Simmons, 50176, September 26, 1865; C. A. Neuhaus, 48427, June 27, 1865; R. Bridge, 52957, March 6, 1866, all air-vents, and Eng. pat. 333, A. D. 1859. No references are cited as against the remaining claims, because of the objection already made to them—*i. e.*, having new matter.

As the broad claim has been rejected, applicant is required to divide this application unless he can draw a broad claim possessing patentable novelty and covering both modifications.

S. W. STOCKING, *Examiner.*
PURMAN,
Third Assistant Examiner.

In the Matter of the Reissue Application of THOS. R. HICKS (assignor). Treating beer. Filed December 2, 1878.

DECEMBER 17, 1878.

To the Commissioner of Patents.

SIR: I hereby amend my specification as follows: On page 1 erase lines 19 to 28, both inclusive, and insert:

"A." Insert on page 1. My invention consists in a novel mode of treating fermenting liquors, especially beer, by subjecting the liquor in the casks to a continuous automatic predetermined pressure, which consists in confining the liquor during fermentation in an air-tight vessel and automatically relieving the cask of any pressure in excess of the predetermined pressure, whereby the gaseous pressure produced by the liquor itself is kept within the cask at any desired degree, as hereinafter described.

Erase all the claims except the third.

THOS. R. HICKS,
By A. H. EVANS & CO.,
Attorneys.

In the Matter of the Application of THOS. R. HICKS. Reissue. Brewing. Filed December 6, 1878.

To the Commissioner of Patents:

SIR: I hereby amend my specification by erasing the claim 132 and substituting the following:

Per "C" "B." Insert on page 4. The method of conducting the fermentation of liquids, which consists in subjecting the fermenting liquids in an air-tight vessel to a predetermined automatically maintained pressure of the gas generated in the fermentation, substantially for the purpose described.

THOS. HICKS,
By A. H. EVANS & CO.,
Attorneys.

(Room No. 157. 27713.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C., *Dec.* 30, 1878.

Reissue. Vent-plugs. Filed December 2, 1878.

Thomas R. Hicks, care A. H. Evans & Co., present:

The statement of invention and the present claim, having no warrant in the original specification, must be adjudged new matter; therefore not admissible in their present form. Before further action can be had the statement of invention and the claim must be limited to the precise invention shown and described by the patent—that of a vent-plug.

R. G. DYRENFORTH, *Examiner.*

WEST.

WASHINGTON, D. C., *January* 7, 1878.

To the Commissioner of Patents:

SIR: In the matter of the application of Thos. R. Hicks, application for a reissue of patent No. 63636, filed Dec. 2, 1878, in reply to office letters of December 30 ultimo, we beg to take issue with the examiner regarding the questions of new matter as therein raised.

The present claim is for an improved "method" of fermenting beer. The claim in the original patent is for a particular device to be utilized in a particular way, as described in the specification. We assume that it will not be disputed that should the description in the specification be of such a character as to enable one skilled in the art of brewing to apply the device in such a way that the process or method claimed in the reissue will be the resultant effect of such application, the applicant is entitled to the claim to the method.

With this premise, let us inquire what are the necessary features or incidents to this method claim: 1st. The beer must be fermenting—*i. e.*, in the process of fermentation—not fermented; 2d, it must be in an air-tight vessel; 3d, it must be subjected to a predetermined automatically maintained pressure produced by gases generated inside the barrel.

These three conditions, if they exist in the old patent, fully warrant the new claim, and, in the process of brewing, bring about certain good effects well recognized as producing a superior article of beer.

As to the first condition the specification specifically says the liquor in the cask is "fermenting liquors," and the examiner has no right to assume that the applicant meant any other kind of liquor than that undergoing fermentation or "fermenting." There can exist no right to assume he meant anything else than what he says.

As to the second condition, the applicant in his original patent specifically alleges that his purpose is to have the vessels air-tight.

As to the third condition, the device described by applicant is stated by him to be for the purpose of affording automatic relief to an overpressure of "gases" inside the vessel, and, "whenever it may be desirable to increase or diminish the pressure of the valve, it is only necessary to turn the thumb-screw in or out." Hence, the pressure is predetermined, because the valve has to be set at some point, being susceptible of adjustment. The relief is automatic; hence the pressure is "automatically maintained," and the pressure is stated to be gases generated in the vessel.

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These conditions, fully maintained in the old patent, are the precise conditions incident to the claim in the reissue, and we therefore confidently submit that the examiner is in error in the finding, and ask a further consideration.

Very respectfully,

A. H. EVANS & CO.,
Attorneys for Thos. R. Hicks.

(Room No. 151.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C., *Jan.* 8, 1879.

"Vent and plug." (Reissue.) Filed Dec. 2, 1878.

Thomas R. Hicks care A. H. Evans & Co., present:

The argument filed the 7th inst. has been duly considered, and no good reason is perceived for modifying previous actions. The original specification contains nothing to indicate that the inventor had even the remotest idea of any process of manufacturing beer. The word "beer" does not appear anywhere. The expression "fermenting liquids" may mean wine. This expression is used to indicate one application of the vent, and this not for any effect upon the liquor, but to prevent bursting of the vessel.

A second rejection is declared.

R. G. DYRENFORTH, *Examiner.*

WEST.

In the Matter of the Application of THOMAS R. HICKS. Reissue. Brewing. Filed December 6, 1878.

JANUARY 9, 1879.

To the Commissioner of Patents:

"C." SIR: I hereby amend my application by erasing in the claim the word beer wherever it occurs and inserting the word "liquids," so that the claim may conform in phraseology as near as possible to the original specification.

THOS. R. HICKS,
By A. H. EVANS & CO.,
Attorneys.

Respectfully recommended January 11, 1879.
R. G. DYRENFORTH, *Examiner.*

Approved.
January 11, 1879.

W. H. DOOLITTLE,
Assistant Commissioner.

(Room No. 151. 27713.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C., *Jan.* 13, 1879.

"Vent-plugs." (Reissue.) Filed Dec. 2, 1878.

Thomas R. Hicks, care A. H. Evans & Co., present:

This application is now in condition for appeal.

R. G. DYRENFORTH, *Examiner.*

WEST.

134 WASHINGTON, D. C., *Aug.* 19, 1879.

To the honorable Commissioner of Patents.

SIR: We have to ask the return of the original patent in my application for a reissue of patent No. 63636, dated April 9, 1867, for an improved vent-plug, as I do not further propose to prosecute it.

THOS. R. HICKS,
By A. H. EVANS & CO.,
Attorneys.

(1878. 27713.)

Reissue. Div. 3.

No. —.

Thomas R. Hicks, assignor, to Otto Zwietusch, of New Britain.

STATE OF CONNECTICUT, *County of Hartford:*

Vent-plugs.

Rec'd Dec. 2, 1878.
Petition. Dec. 2, 1878.
Affidavit. Dec. 2, 1878.
Specification. Dec. 2, 1878.
Drawing. Dec. 2, 1878.
Abstract of title. Dec. 6, 1878.
Old patent, No. 63636. April 9, 1867.
Cert. dep.
| Cash, $30. Dec. 2, 1878.
Examined.
V Issue.
4 Patented.
Reissued.
Circular.
A. H. Evans & Co. Present.

(1878.)

Contents.

Application papers.

Rej. Dec. 13, 1878.
Amd't. Dec. 16, 1878.
Amd't. Dec. 18, 1878.
Dec. 30, 1878. Rejection.
Jan. 7, 1879. Argument.
Jan. 8, 1879. I. Rejection.
Jan. 9, 1879. Special amd't.
Jan. 13, 1879. Letter.
Feb. 5, 1879. Appealed.
Feb. 11, 1879. Ans. to appl.
April 1, 1879. Ex'r's dec'n affirmed.
April 25, 1879. Appeal to Com. from dec'n of board.
July 7, 1879. Dec'n of board aff'd by Com'r.

Aug. 19, 1879. Old patent withdrawn.
Title (look under).
Improvement in brewing and fermenting for drawing.
Brewing and fermenting.
Fermenting vats.
Ex'd: H. M.
H. M. H.

135 The complainant then read in rebuttal the depositions of Walter S. Haines, Frederick M. Ruschhaupt, and William J. Seib, and the various publications, exhibits, and stipulations therein mentioned or referred to; all which depositions and exhibits are as follows:

Complainant's Evidence in Rebuttal.

Testimony taken in behalf of the complainant before Charles C. Linthicum, notary public, at his office, in the city of Chicago, on the 9th day of October, A. D. 1882, and succeeding days, pursuant to previous notice and consent of parties.

Present: F. W. Cotzhausen and P. C. Dyrenforth, for complainant, and Charles P. Jacobs, for defendants.

By consent of parties all objections as to time and place of taking such depositions, and all matters of form as to the manner of certifying and returning the same are waived, all objections on the ground of irrelevancy, incompetency, and immateriality being, however, reserved.

FREDERICK M. RUSCHHAUPT, being duly sworn, testifies:

Q. 1. What is your name, age, residence, and occupation?

A. My name is Frederick M. Ruschhaupt; age, 48 years; residence, Milwaukee; occupation, technical and analytical chemist.

Q. 2. Will you please inform the court what early studies and engagements you have followed leading to your present occupation and position?

A. After I had received a most careful preparatory education, I studied at first at the Polytechnic Institute, at Bielefeld, Germany. I studied there at first half a year; then I was engaged in dyeing and calico printing works, for acquiring a knowledge in practical and applied chemistry; then I studied at Berlin, hearing lectures at the university, on mathematics, natural sciences, and particularly chemistry, half a year; then I returned to the Polytechnic Institute, at Bielefeld, where I remained two years; then I resumed my studies at the university, at Berlin, in mathematics and natural sciences, but particularly technical and analytical chemistry, for three years in succession; then I came to America, in 1857; since then I have been engaged in New York and other cities of the Union as technologist and chemist, etc.

Q. 3. Have you followed that position on the American continent ever since?

A. I followed it for six years and a half, at first; then I returned to Berlin, being engaged in my profession, and studied and heard

lectures in the university, in the same branches of sciences, when I returned to America, in 1864, and devoted my time to technology and chemistry, making chemical analysis, etc. In the year 1868 I commenced to publish a brewers' journal, The Brewery, a
136 a monthly periodical, which I published for ten years, first in the city of New York and afterwards in the city of Milwaukee, Wis. During the time of publishing this paper I devoted constantly the most of my time to the art of brewing, etc., as brewer's engineer, architect, and consulting chemist.

Q. 4. Has your profession brought you in constant contact with the brewing trade of this continent since 1868?

A. It has, sir.

Q. 5. Have you constantly kept informed and posted as to the practical and scientific progress of the art?

A. I have.

Q. 6. We may take it for granted, then, from what you have said, that for about fourteen years past the brewing trade has been a specialty of yours?

A. Yes, sir.

Q. 7. Have you, in the course of your connection with the trade and in the pursuit of your general scientific studies informed yourself of the brewing literature—the various publications on the state of the art, European and American?

A. I have.

Q. 8. Have you not written a great many articles on the subject of brewing and on the progress of the art yourself, Mr. Ruschhaupt?

A. I have.

Q. 9. When we find the name of Ruschhaupt referred to in some of these late publications on the art of brewing—for example, in Lintner and Von Wagner, and different polytechnical journals, are those references to yourself, or is there another Ruschhaupt engaged in this particular branch?

A. Those are references intended for me. I do not know of any other Ruschhaupt engaged in the same pursuit.

Q. 10. Has not the subject and art of brewing for the last twenty years been covered extensively by numerous publications and periodicals, abroad as well as here?

A. Yes, sir.

Q. 11. Give us the names of some of the leading text-books and periodicals published in the United States for the last five or ten years on this subject.

A. The American Brewer, The Brewery, The Western Brewer, The Brewer's Gazette.

Q. 12. Give us the names of some of the leading text-books and periodicals in Germany, for the last ten or fifteen years.

A. The Bavarian Beer Brewer, a periodical at Munich, by Professor Lintner; The Bohemian Beer Brewer, a periodical published at Prague—I do not remember the name of the editor; The Swabian Beer Brewer, a periodical published at Waldsee, Wurtemburg; The Beer Brewer and Manufacturing of Malt, a periodical published at Vienna.

Q. 13. Give us the names of some of the leading hand-books and text-books that have been published in Germany covering the art.

A. There is an old book by Paupie, a book of great importance for theoretical as well as practical brewers, published at Prague, 1794; second edition, 1820–'21. Then are to be named some publications of Habich. First, a hand-book on the chemistry of beer, Leipsic, 1858; next, The Manufacture of Malt, Leipsic, 1879; School of Brewing, 1859—all published by Habich. Then a course book on brewing published by Professor Otto, at Brunswick, con-
137 tinued by Dr. Karl Lintner, professor of chemistry and special chief of the technological division for brewers, distillers, etc., at the Royal Bavarian Agricultural School at Weihenstephan; The Chemistry of Fermentation; The Art of Brewing and Distillation, published by Dr. C. Stahlschmidt at the Royal Polytechnic Academy in Berlin; Hand Book of Brewing, by Professor L. Von Wagner, professor at the Polytechnical High School, Budapest, and a member of many foreign scientific societies, published at Weimar in 1877—two volumes.

Q. 14. The two books named by you as written by Dr. Lintner, and L. Von Wagner are among the latest of German publications relating to the art, are they not?

A. They are.

Q. 15. About how many publications altogether, periodicals, text-books in various languages, German, English, and French, are there covering this particular art; have you any idea?

A. Several hundred, I believe.

Q. 16. Are the periodicals and text-books which you mentioned in particular leading publications relating to the art?

A. They are, more or less.

Q. 17. What do you say of the German publications, especially those which you mentioned of Dr. Stahlschmidt, Lintner, Von Wagner, Habich—what is their standing in the brewing art or trade?

A. Some of them are, indeed, leading publications.

Q. 18. Are not all of them accepted by the brewing fraternity and trade as standard works relating to the art—authority?

A. I believe they are.

Q. 19. Now, while such is the case, Mr. Ruschhaupt, can you tell me whether there is any branch of the brewing trade that is not more or less covered by the publications, text-books, and periodicals to which you refer?

A. According to my opinion, such publications cover substantially all that has been accomplished in regard to the art of brewing.

Q. 20. What is the object of publishing, in Europe and on the American continent, this multiplicity of periodicals relating to the trade?

A. The object is to make their readers fully acquainted with all that may be useful for them to know in their respective art; to make known to them particularly all that has been done in improving the facilities for the manufacture of malt and beer.

Q. 21. May we take it for granted, Mr. Ruschhaupt, considering this great variety of books, periodicals and publications, abroad and here, that by the aid of these printed publications we can follow the progress of the art from year to year as it develops?

A. You can; you may take it for granted, decidedly.

Q. 22. The European publications—have they become introduced into this country?

A. They have, to a great number, particularly those that have been published within the past few years.

Q. 23. They can be had in any bookseller's or publisher's shop?

A. They can be ordered. The most important of them may be had at any time in the American market, and others, if not on hand, can be ordered.

Q. 24. Is it, or is it not a fact, Mr. Ruschhaupt, that in the
138 latter publications—in Europe, for example, Lintner and Von Wagner—American periodicals are frequently referred to, like your own or Schwartz' or others?

A. It is.

Q. 25. And so, again, the American periodicals, edited and published on this side of the ocean, are based, to a great extent, upon the European periodicals and publications, are they not?

A. They are.

Q. 26. Now, will you please look at these books here; the first one, a German publication by Dr. C. Stahlschmidt, published at Berlin, 1868; is that one of the leading and standard books which you before referred to?

A. It is one of the leading books.

Q. 27. Do you know whether it was published and accessible to the public in the ordinary course of the trade from the year 1868?

A. It was published and at once accessible to any one throughout the civilized world.

Q. 28. And the same is accepted as a standard work?

A. The same is accepted as a high standard work, both by the trade and scientist.

Q. 29. What you have stated as to Dr. Stahlschmidt and his publications of 1878, does that to a like extent apply to the other books here now shown you, of Dr. Karl Lintner, published at Brunswick in 1877 and '78, and the Beer Brewery, by Ladislaus Von Wagner, published at Weimar in 1877?

A. Relating to the book published by Dr. Lintner, it particularly does apply to the same extent.

Q. 30. They are all standard works and have been accessible in the market from the time of their publication?

A. Yes, sir; and they are found in the hands of a great many brewers in this country.

Complainant now offers in evidence—

1. A certain publication entitled "The Art of Brewing and Distillation," by Dr. C. Stalschmidt, Berlin, 1868, and offers to read therefrom, on pages 216 to 222, "The Fermentation of Lager Beer,"

a translation whereof is hereto annexed, marked "Complainant's Exhibit No. 1:"

COMPLAINANT'S EXHIBIT No. 1.

(From "The Art of Brewing and Distillation," Berlin, 1868.)

By Dr. C. STAHLSCHMIDT.

"*The Lager Fermentation of Beer.*"

Pages 216–222.

The period of time, at the end of which the fermented young beer is transferred to the lager casks, depends upon the degree of advancement of the fermenting process, and hence, upon the temperature of the fermenting cellars; and likewise upon the kind of beer, whether it be summer or winter beer, and whether it be intended for early consumption or is not to be used for a considerable length of time.

In the process of after fermentation everything depends upon the young beer's retaining enough of the yeast to continue the fermentation till the beer is consumed, or to secure the new formation of yeast in sufficient quantity.

Hence, winter beers, which are intended for early use, receive less yeast, or are casked in a clearer and more mature state than the summer beers, which, on the contrary, are casked in a less mature condition.

In case the yeast has become too much precipitated in the winter-young beer, and the beer has become too much matured, the required yeast is added in the lager casks in form of kraeusen beer.

No less important in the treatment of winter and summer beers is the temperature of the lager cellars, for that determines (regulates) the process of fermentation.

Therefore, as has been previously remarked, the winter beers are placed in the warmest and the summer beers in the coldest cellars, whereby the former are made to ferment more rapidly and the latter more slowly.

139 In order correctly to understand the lager treatment of the various beers, and to comprehend the difficulties which usually attend a properly conducted fermentation, we must understand that the beer is a product of a fermentation, which is far from being completed, but is still progressing, and should continue to be energetic enough to cover the unavoidable loss of carbonic acid.

Therefore, in young beer there must continue to be on hand a quantity of sugar, sufficient not only to sustain the fermentation until the beer is consumed, but also to yield a surplus at the time of consumption, upon which the agreeable taste of the beer materially depends.

Very often it is impossible to maintain a proper equilibrium between the loss of carbonic acid and its reproduction; it may always be presumed that in the after fermentation more carbonic acid is produced than is lost, and that hence a surplus is always created, which appears in the form of free carbonic acid. If now it

be remembered, that during the fermentation new yeast is constantly produced, and thereby the fermentation is constantly accelerated, the great danger will become apparent to which the beer must be exposed during the after fermentation, if the latter cannot be moderated, or confined within certain limits. In this latter case the beer matures sooner than is desired, and it then degenerates and becomes flat, if it be not immediately consumed. The brewer must therefore strive so to conduct the fermenting process that the beer may be consumed several weeks earlier or later than the time fixed for that purpose, which can be done without injuring the quality of the beer, because half of this time, either preceding or following the period of the beer's highest excellence, would not materially affect it. In the very last stage of the lager fermentation an advantage accrues to the brewer from the fact that the fermentation is constantly retarded, because the ingredient of sugar is constantly diminished.

The simplest course would be to fill the several lager casks at once with the young beer; but experience has shown, that in such case the lager fermentation would not proceed as desired, and the beer would soon be spent and flat. Therefore the lager casks are but gradually filled with the young beer of successive brewings, whereby the fermentation is made to proceed more slowly and more regularly, and a beer of uniform color and taste is produced. By the gradual addition of the young beer the cessation or suspension of the after fermentation is prevented until a certain period of time; but inasmuch as the entire quantity of sugar is but fractionally subjected to the fermenting process, it is exposed to the fermentation in constantly reduced quantities, and the latter is thus retarded. Since the temperature of the fermented young beer is higher than that of the lager cellar, this successive addition effects a cooling of the beer in the casks, and thus reduces the temperature of the cellar, and to that extent also retards fermentation.

Whilst in the foregoing we have indicated in a general way the rules to be observed in the casking of young beer and its treatment while at lager—the methods pursued in practice nevertheless differ very much, which is not at all surprising, since the temperatures of the fermenting and lager cellars are not uniform, and the extract ingredients of the young beers also vary.

In the main, the methods of treating winter and summer beers should be as follows:

Winter beer, which is to be consumed soon, usually after a few weeks, is usually filled, one brewing after another, in the form of young beer, into the required number of casks, so that these are filled after a fixed time—not later than five days.

After the casks are completely filled it enters upon the last stage of young beer fermentation, which is called the angreifen of the beer, is completed after about 2 to 4 days, and is gradually resolved into lager fermentation. The latter allows the yeast to be precipitated, so that after about eight days the beer is clarified.

Although the beer may be drank, and is often thus dispensed when scarcity ensues, yet it is better to continue the filling of the

cask, and especially the lager fermentation, for some weeks, as thereby the excellency of the beer is in a great measure increased.

After the casks are filled with young beer, and the bung-hole is cleansed of the foam thereby expelled (a task which is repeated several times, and at last with clear water, on account of the more rapid clarifying of the beer, until at last a hood of foam appears upon the bung-hole, which is denominated the stechen of the beer), the casks remain open, or but loosely bunged, until complete clarification has ensued and the lager fermentation has been brought to the normal state. Shortly before the beer is to be used the casks are bunged, and thus the carbonic acid is prevented from escaping and is forced to remain in the beer, whereby the beer is made effervescent.

The length of time the bunging is to be continued depends upon the temperature of the cellar; the lower this is, the longer the former must be, because the capacity of the beer for absorbing carbonic acid increases with the falling of the temperature.

In order to prevent a surfeit of carbonic acid and an excessive pressure thereof upon the cask (whereby in an extreme case the cask might burst, and at all events, upon the opening of the bung, the rapid liberation of the carbonic acid would produce a disturbance of the yeast and cause the beer to become turbid, which would necessitate again resting the beer and a repetition of the bunging), it is advisable to provide the bung itself with a valve apparatus which permits the escape of the carbonic acid when it has reached a certain degree of pressure.

140 Heeren has recommended for this purpose a hydraulic valve-bung, and Habich has suggested Mohr's contrivance, which has long been used in laboratories, in which the common wooden bung is longitudinally hollowed and the opening covered with a tightly stretched plate of caoutchouc. Although this latter contrivance is very simple, it is nevertheless but little used, because the bung cannot be firmly driven into the cask without impairing the caoutchouc plate.

The desired object is accomplished with the bung used in the brewery of Mr. Lipps at Berlin. (Fig. 59.) This is bored longitudinally two-thirds its length, and the opening thus made is connected at its base with a transverse bore from one side, and this latter opening is closed by a caoutchouc band, A A, surrounding the bung like a band around the pocket-book, and permits the escape

Fig. 59.

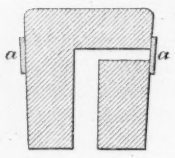
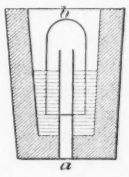


Fig. 60.



of carbonic acid, when the latter on reaching a certain degree of pressure raises the caoutchouc band. A hydraulic bung, shown in

Fig. 60, is also used in the same brewery. A is a glass tube, which extends through the base of the bung, and is surrounded with water, in which the glass bell B is immersed. There the carbonic acid is forced to pass out between the tube and the bell.

In lieu of giving the beer its requisite effervescence in the lager casks, this may also be done in the tapping kegs, which may be filled and firmly bunged and allowed to rest for a time before they are tapped.

The drawing of the beer from the lager casks into the kegs is done by means of a hose, which is connected with the tap-cock and introduced into the bung-hole of the keg to be filled, so as to extend into the bottom of the keg, whereby the beer is made to flow without foaming.

It may happen that the draught beer must be tapped (used) without possessing the requisite effervescence, which may be owing either to its having worked too much or to the time of bunging having been too short.

In such case the practice prevails in Berlin frequently to add to the beer in the lager casks younger beer, which has not advanced so far in the lager fermentation, and then to bung the casks.

In Bavaria the universal practice is not to give to the draught beer its effervescence in the lager casks by bunging these, but, on the contrary, to mix the beer when it has become clarified, fine, and bright, in the tap-kegs, with one-tenth to one-sixth in volume of kraeusen beer, and then to bung the kegs as soon as the first violent fermentation is over and the beer again begins to become clear. The carbonic acid thereupon generated is retained by the beer, whereby the latter becomes heavily charged with the former, and in tapping produces a fine, thick white foam.

Although this method of treatment (by adding kraeusen beer) offers many advantages it is not resorted to in this country, because such (kraeusen) beer (beer thus treated) always retains the characteristics of young beer, and is inferior to beer which has passed through a more extended lager fermentation. It may be compared with the latter like young champagne to that which is old and well settled. Upon the whole, the excellency of young beer increases in the proportion in which the preparation and treatment of it approximate to those of lager beer. Hence, the slower the fermentation is conducted and the longer the after fermentation continues, without however surpassing the point of completion, the more wholesome and the more delicious the beer will be.

Summer or lager beer is subjected in the main to the same mode of treatment as the winter beer; but, inasmuch as it is not to be consumed for several months, the treatment of it during the time it is stored away is obviously attended with much greater difficulties. Not only must the temperature of the lager cellars be kept as low as possible, but the after fermentation must also be retarded as much as possible, or rather a continuous lager fermentation must be maintained, by filling the large lager casks very slowly—that is, by distributing the finished young beer only at longer intervals of time, according to the extent of the brewery, evenly and simultaneously amongst 10 to

15 casks. In the first beginning the distribution of the young beer takes place more frequently, until the casks are half filled; thenceforth only after intervals of 4 to 8 days. The fact that experience has taught that the fermentation is slowest in half-filled casks of course leads to the conclusion that the last filling of the casks must not occur until a point of time not too far removed from the time the beer is to be consumed. That interval may be the longer in proportion as the temperature of the cellar is lower and the larger the casks are.

The distribution of the young beer must take place in such manner that the beer, in consequence of the slow fermentation, is kept turbid and is not clarified. Upon this also depends the quantity to be added from time to time, as well as upon the temperature of the cellar. It is hardly necessary to state that those casks which are to be used first must also be first filled, nor can the number of days be stated in advance within which a cask should be filled.

141 Ordinarily the last adding of the young beer is done four weeks prior to the time of using the beer; wherefore the entire period of filling may be extended over the preceding three to four months.

But it frequently happens that the casks are filled within one and a half to two months, in which case it must be remembered that the lager cellars had a temperature of 3° C., and that in the brewing the very best hops were used, whereby the lager fermentation is materially retarded. Hence, it is obviously within the power of the brewer to have his beer fully perfected within a longer or shorter period of time, according to the demand. Upon the whole, the care and treatment of lager beer are similar to those of kraeusen beer, with the exception that with the former, instead of using kraeusen beer for filllng, young beer is used which has passed beyond the stage of violent fermentation.

What kraeusen beer is required to accomplish in a few days with draught beer is brought about in months of time with lager beer by filling with young beer.

When the last young beer is added the lager casks should be filled so as to leave a space of a half tun, so that in the last stage of the main fermentation which takes place in the casks, and which is here also called (angreifen) of the beer, no beer is expelled by the light brown foam thereby produced. After a few days this last fermentation is ended, the yeast is precipitated to the bottom, and the beer begins to become completely clarified, and the foam is formed into a comparatively solid covering on the service. Thereupon the casks are filled with young beer, either forthwith, or usually not until within one to four weeks before the beer is drawn off, and while this filling is being done the brown foam which arises either spontaneously, or is expelled by striking the sides of the cask with a hammer, is carefully removed, and thereupon the casks are bunged.

The last process of filling and the bunging—*i. e.*, the time required therefor—is regulated by the consumption of the beer, and it is not necessary to wait until the formation of the hood of foam about the bung-hole by the last stage of the fermentation is completed, because

this fermentation does not progress with the energy as is the case with draught beer, and because, in this latter case, the carbonic acid thus generated should be wholly retained in the beer.

In case, after the casks are quite filled, they are, however, not bunged at all, or not until after awhile, then a fine white hood of foam is likewise formed by the slowly progressing lager fermentation, a sign that the bung should be loosely inserted, or a valve-bung should be used. Then, instead of giving the beer, in this case, the required effervescence in the lager casks by perfect bunging, as is frequently done, which requires the more time the older the beer has become, and may last one to three weeks, the effervescence is frequently, for the first time, imparted when the beer has been drawn off into tap-kegs by bunging and resting the kegs.

In like manner, as the required effervescence can be produced in draught beer by the addition of kraeusen beer, so lager beer, which has advanced too far in fermentation, may be treated in the tap-kegs with young beer and then bunged. For this purpose clear solutions of sugar may even be introduced into the lager casks to feed the beer therewith, as it were, in order to maintain the fermentation, whereby sometimes considerable losses may be prevented.

2. A certain publication, entitled "Manual of Beer Brewing," by Prof. Ladislaus Von Wagner, Wiemar, 1877, and offers to read therefrom, on pages 728 to 729, "Hastening the After Fermentation and Clarifying," a translation whereof is hereto annexed, marked "Complainant's Exhibit No. 2."

COMPLAINANT'S EXHIBIT NO. 2.

(From the Manual of Beer Brewing, Weimar, 1877.)

By Prof. LADISLAUS VON WAGNER.

Hastening the After Fermentation and Clarifying.

Pages 728–729.

"Leo Meller, a mechanic of Ludwigshafen-on-the-Rhine, has constructed what is called a bung apparatus, for the purpose of accelerating the clarifying of beer, and which apparatus is successfully employed in many breweries. By means of this apparatus beer, as soon as racked from fermenting tubs into casks, is put up under pressure of pure carbonic acid gas. As is well known in breweries, where bunging is practiced, every cask is bunged by itself, and very close attention must be paid to the time when the beer ripens, as otherwise the casks burst and the beer becomes over-bunged. By Meller's process the casks of any particular section, or of the entire cellar, are connected with each other and with the carbonic acid gas generator. Pure carbonic acid gas is thereby brought to bear upon the beer immediately upon the closing of the casks, and the superfluous carbonic acid gas, which may be generated, is conducted out into the open air.

142 This apparatus also enables the brewer to increase or decrease at pleasure the pressure in the casks, which are connected, and the effervescing of the beer is consequently not any longer depending upon accident and temperature, but upon the pleasure and will of the brewer.

Beer treated in this manner is said to become ripe and bright in from eight to ten days, whereas ordinarily it takes two months. Besides these great advantages, which of themselves fully pay the expense of the apparatus, this method of treatment possesses the following additional merits: Beer so treated can generally be drawn off as early as the sixth day, and it would therefore seem quite unnecessary to kraeusen the beer; as carbonic acid gas is well known to be one of the best means of clarifying, beer bunged in this manner will continue to contain a highly fine lustre, a genuine natural taste, and is also very retentive of carbonic acid gas. An overbunging of the beer by the use of this method cannot possibly happen.

Mr. Meller primarily recommends his apparatus (which, by the way, is already introduced for four years and spread over the whole European continent) for warmer climates and for breweries which brew during the summer season."

3. A certain publication, entitled "Treatise on Beer Brewing," by Dr. Carl Lintner, Braunschweig, 1867, and offers to read therefrom an article on "The Treatment of Young Beer," on pages 306, 309, 311, translations whereof are hereto annexed, marked "Complainant's Exhibit No. 3."

COMPLAINANT'S EXHIBIT No. 3.

(From the "Treatise on Beer Brewing." Braunschweig, 1877.)

By Dr. CARL LINTNER.

"*The Treatment of Young Beer.*

Page 306.

If now the beer is about te be consumed (used) the casks are usually first bunged, in order that carbonic acid gas may accumulate, and the beer may acquire effervescence. A suitable bung, made of soft wood, is well wound about with good hemp or tow, and is driven with an iron sledge half its length into the bung-hole. The cask about to be bunged must be still engaged in the after fermentation, and should be empty to a depth of the width of two fingers below the bung-hole, so that the accumulating carbonic acid gas my find room.

Whether the effervescence will set in after a longer or shorter period of time depends upon whether the condition of the after fermentation be more or less energetic, so that, under ordinary circumstances, the beer will be provided with a sufficient amount of effervescence and be fit for drawing off, where the preceding lager period was eight days, after a bunging of three to four days; where the lager period was fourteen days, after a bunging of six to eight days; and

where lager period was three to four weeks, after a bunging of ten to fourteen days.

With bunged beer which cannot be drawn off within the time limited the bung must be loosened frequently by carefully holding fast with one hand and striking it with a mallet in the other in such a manner as to permit carbonic acid slowly to escape. If in the course of this manipulation a peculiar noise is observed (blowing off) this venting of the cask must be repeated every few hours until the pressure is diminished. When the cask is tapped under these circumstances a rising of the yeast sometimes takes place, whereby the beer becomes turbid (called "rising"). Such beer is said to be "overbunged." The faucet must then be inserted with great caution and partially opened. It is still more expedient first to make a gimlet hole through the bung to permit the excess of carbonic acid gas slowly to blow off.

Again, a loss of beer may be brought about by the venting of the cask, unless this is done with care. In such case a quantity of the bunged beer is first drawn off, and then the cask is vented in the manner stated. After that is done the faucet is driven firmly into the cask, so that after awhile samples may be drawn. When the beer again appears clear the bung is again vented and the drawing off is begun.

If the beer is bunged too late it will not any more acquire the requisite effervescence and will remain flat. By adding some beer that is engaged in active fermentation, so-called "kraeusen beer," or some very young (green) beer, the effervescence may be restored.

Page 309.

In America, according to Schwartz ("The American Beer Brewer"), published at New York, the beer, while in the shavings casks, is generally mixed with "krauesen." But it does by no means follow that shavings casks are resorted to only for this purpose, for shavings tend to assist equally as well in the clarification of lager beer, when in the process of after fermentation.

Such treatment recommends itself, especially in places where it is desired to work rapidly, and a larger demand has to be met during the summer months by the use of ice-houses and drawing off into shavings casks for purposes of kraeusen.

143 The beer, which is so "kraeused," while on shavings, will partly remove its turbid particles by steady ejection from the bung-hole, in consequence of the increased flow of the after fermentation and partly by deposit among the shavings.

Page 311.

"As bearing upon the quicker clarification of beer, I mean to mention at this place still another apparatus, which has been invented by a mechanic, Leo Meller, in Ludwigshafen-on-the-Rhine, and which has been introduced into various breweries with success. By this so-called bunging apparatus the beer, as soon as it has been drawn off from the fermenting tubs into casks, is immediately put

under pressure of pure carbonic acid gas, and thereby, in the course of eight or ten days, it becomes ripe and bright."

4. A certain periodical, entitled the "American Beer Brewer," by A. Schwartz, New York, June, 1878, and offers to read therefrom an article on "Bunging by Means of Carbonic Acid Gas," a translation whereof is hereto annexed, marked "Complainant's Exhibit No. 4."

COMPLAINANT'S EXHIBIT NO. 4.

(From "The American Beer Brewer," New York, June, 1878.)

By A. SCHWARTZ.

"*Bunging by Means of Carbonic Acid Gas.*"

The object of bunging is well known; it is intended to bring about a greater accumulation of the carbonic acid gas generated in the after fermentation and to impart to the beer about to be drawn off more effervescence.

The malt extract gained in the process of brewing is decomposed into carbonic acid and alcohol by means of the yeast operating as the initiatory cause of fermentation.

The more the fermentation of the beer wort progresses, and the higher the degree of fermentation, the more extract will be consumed by this chemical process of decomposition, and the greater will be the product of carbonic acid and alcohol.

There is, however, in this a visible limit—that is, we can observe the progress of the fermentation, and can determine by certain physical phenomena which obtrude themselves upon a practical eye the precise time when the fermentation proper, or main fermentation, is ended.

But still the fermentation of the wort continues, and with it the further decomposition of this extract, in such a manner that we cannot pursue this process throughout its entire progress by external observation, and can determine it only by the use of exact and sensitive gauging instruments.

The duration of the entire process of fermentation depends upon divers factors—upon the composition and strength of the beer wort as results of the raw materials used, upon the quality and quantity of the setting yeast which is applied, and upon the temperature at which the fermentation is conducted.

A low temperature exerts its influence, not only upon the multiplication of the yeast, and, as the direct result, upon the decomposition of the beer wort, upon the slower generation of carbonic acid gas, but it also acts as a mighty binding medium for the latter, in that it prevents its escape and retains it in the beer.

The question whether the carbonic acid is chemically bound in the beer, or is only suspended mechanically and retained in the beer by a low temperature, is not yet decided. By being chemically bound we mean a union which the carbonic acid has formed with some other solid or liquid substance, and which it maintains until it

is set free therefrom by some other more powerful acid or by other physical influences, such as heat.

I am decidedly of the opinion that the carbonic acid enters into no chemical union with the beer; that it is but tempo-
144 rarily absorbed in form of gas by the solid substances contained in the beer, to wit, dextrine, gum, and particles of proteine, and relinquishes this loose combination again and escapes under the influence of heat and motion.

In the course of the chemical decomposition in the fermentation of the beer wort heat is generated, and this involves an unavoidable escape of carbonic acid in the formation of kraeusen. This loss, however, is so inconsiderable in comparison with the constant new generation of this gas that in this stage of the fermentation it may be left out of view, inasmuch as no dangerous consequences, no flattening of the beer, can result from it.

However, as soon as the formation of the "kraeusen" is over, and these recede, the then still fermenting wort should be brought to the lowest possible temperature, in order to prevent the escape of the carbonic acid, and to facilitate its complete absorption in the beer.

After the main fermentation is completed, our beers are transferred into lager casks (lager beer) or, into what are called "ruh" casks (Schenk beer).

The lager beers which are brewed in the winter are "kraeused" in February or March, and after they have either spontaneously become clear, or have become clarified by means of shavings or fining ("schoene"), they are bunged and drawn off.

Many brewers treat this lager beer like "ruh" beer, pump it into shavings casks, mix it with a portion of young beer and "kraeuse" it. These beers, as likewise the Schenk beer, when drawn into shavings casks, are made to work violently so as to overflow, and this working—which is attended with an irretrievable loss of beer, carbonic acid and other matter—is advanced by constantly adding beer or water. In case these beers do not become clear and bright, notwithstanding this waste of labor and valuable substance, then isinglass is resorted to, the use of which proves effective in most cases. The beers are then bunged, and, by reason of their large ingredient of yeast, soon begin to work—that is, they exhibit a more rapid generation of carbonic acid than those purer lager beers, which are less strong, or were "kraeused" long before bunging.

It is self evident that in all these operations a low temperature should co-operate; cold cellars are a necessity, and where they are wanting, very unpleasant disturbances often occur.

The excellent construction of our over-ground ice-houses, and the production of a desirably low temperature, by means of the use of natural ice, have contributed materially to facilitate the work of the cellar, and enable us to secure with a certain degree of certainty successful results.

As is mentioned above, all the beers are bunged. I have repeatedly recommended the drawing off beers kept in very cold cellars (below 40° R.) without first being bunged, because when

dealt out they develop a much more powerful and compact effervescence than the beers that are bunged. Those beers which are not bunged are also better adapted to bottling and to distant transportation. But it is difficult to overcome the prejudices against the practice of not bunging, though the most cogent reasons be advanced.

In the bunged cask carbonic acid gas generated by the fermentation accumulates, because the surplus cannot escape. The carbonic acid gas, operating under pressure, also involves a more rapid after fermentation, and as a result a still greater quantity of carbonic acid in the beer, which is not the case with beer that has not been bunged. It is impossible to draw off the beer from a bunged cask, so long as the bung is fastened air-tight; and in case the bung is removed in order to render the drawing off possible, then not only will a portion of the accumulated carbonic acid gas rapidly escape, but a portion of it will also be expelled while the racking off progresses, in consequence of atmospheric air entering under a certain increased pressure, and by this mode a loss of carbonic acid is unavoidable.

On the other hand, if, for the purpose of drawing off, atmospheric air is introduced into the cask under increased pressure without removing the bung, no escape of carbonic acid gas can take place, and loss will be confined to that, which is set free in transferring the beer into the retaining kegs and in the foaming incidental thereto. (Beers stored very cold and not bunged scarcely ever foam at all whilst being drawn off.) For this purpose there are being used hand and steam air-pumps, and of late ingeniously constructed steam-pumps which automatically regulate the pressure by means of a safety-valve and render the bursting of the cask impossible. These pumps force the air into the cask, with a pressure of 4 to 6 atmospheres, through india-rubber hose or stationary iron pipes, and through a faucet provided with a valve, which faucet is driven into an aperture corked air-tight adjacent to the bung. This advance in racking has been extended still further by not quite filling the casks and applying the air-pump and pumping air upon the beer immediately after the bunging. This is commonly called "bunging with air," a practice that has been extensively applied and proves successful.

In whatever way the bunging of the beer is done the beer will always be in a certain degree under pressure of carbonic acid gas generated therein. This pressure varies, however, because the generation of the carbonic acid gas and the quantity thereof depend upon the factors above alluded to. A uniform pressure, and, as a consequence thereof, a uniform effervescence, cannot be produced by bunging a number of casks simultaneously. Furthermore, in the methods usually practiced an "over-bunging" of the beer often occurs, producing a turbidness by the rising of the yeast particles and sediments which have already settled in the cask. Then we usually say, "The beer has been rising." This evil is mostly overcome by bunging with air.

A bunging process, introduced of late and first patented in Ger-

many, is now designed to do away with all existing insufficiencies, and to enable the brewer to keep constantly on hand bunged beer without exposing either the beer or cask to any danger and to produce a uniform effervescence. For this purpose a contrivance is used, which the inventor calls a "bunging apparatus." Upon my visit to Germany last year I saw this apparatus at the brewery of Mr. Hofman, at Mannheim. The apparatus consists of a main pipe extending the entire length of the cellar at a certain elevation over the casks. This stationary pipe is connected with the several casks by means of movable pipes (india-rubber hose) in such a manner that if the hose are connected with the casks by means of air-tight fastenings in the bung-hole all the casks thus bunged communicate with each other. The carbonic acid generated in each cask not absorbed by the beer—that is, every superfluous quantity of carbonic acid gas produced will rise through the small connecting-pipes to the main pipe, which is connected at one end with a column extending beyond the height of the cellar and filled with water, representing a column of water, which according to its height regulates the pressure of the carbonic acid in each several cask. The control of the pressure is facilitated by a valve at the mouth of the pipe where it opens into the water column. With this bunging apparatus is connected a carbonic-acid generator, which may be employed at any time when the carbonic acid gas naturally generated in the beer is insufficient to give the beer the desired degree of effervescence.

146 Inasmuch as all our beers are "kraeused" it would seem not to be necessary to use this carbonic-acid generator. The case is different, however, when ruh beers or lager beers, which have not been kraeused, are to be bunged; in the latter case this apparatus (gas-generator) affords decided advantages, to which I certainly attach greater importance than can be derived from the contrivance with kraeused beers.

Mr. George Bartholomae, of Chicago, has acquired the patent right upon this bunging apparatus for the U. S., and has already introduced the same into several breweries. In a circular he mentions, among other advantages, the following:

"Henceforth no beer will be needed for supplying overflowage, as the shavings cask, after adding the 'kraeusen,' is fined, and at once closed up—*i. e.*, connected with the bunging apparatus, and put under pressure of pure carbonic-acid gas then on hand. If the beer is intended for bottling it is not kraeused, for reasons alluded to below.

"By using the above apparatus there is saved 1 to 1½ bbl. supplementing beer for every cask of 30 bbls.

"Half of the very costly fining material, because the yeast, being a flat body, settles more rapidly under pressure of the carbonic-acid gas. The whole carbonic acid, which unnecessarily warms the cellar and corrupts the air, is bound up by aid of the apparatus, and any existing surplus is conducted out of the cellar.

"The use of this apparatus requires less shavings casks, because in ⅔ of the time hitherto required the beer is ready for market and keeps 3 months or longer without any foreign taste (shavings taste)

whatever, while it continues to have the same effervescence, and is ready to be racked off at any time.

"Neither is an "overbunging" possible. The cleansing of the casks becomes wholly unnecessary, as well on the outer sides as below their bed (where by overflowage without this apparatus sour slime and mould fungus are being formed), as by washing and cleaning an increase of the temperature of the cellar is unavoidable; this grievous evil is also obviated by the apparatus, and much labor is saved.

"To such brewers as ship much beer this apparatus is indispensable, in that it enables them at any time to rack off as much beer as is required, and need not bother their heads about the bunging or about any possible delay in shipping, insufficiency of effervescence, or overbunging.

"Unto those brewers who bottle beer themselves or supply bottlers this apparatus is of the utmost importance, as it enables them, in a short time, to give to old ruh beer, without using "kraeusen," sufficient effervescence. How deleterious the "kraeusen" are to bottle beer is well known. By not using them bottled beer can be made to keep 1½ to 2 months longer before it becomes turbid, and the Pasteur-ising (by which process the taste of the beer is impaired) becomes superfluous. In the kraeusen process, in consequence of the long and more violent working out of the beer, a large percentage of sugar is unnecessarily wasted; all of which, by this apparatus, is saved to the beer; thereby a becoming "flat" is rendered impossible, a permanent effervescence is secured, and a saving of malt is effected."

Many of these advantages are substantiated by the processes mentioned by me above; but whether the Pastuer-ising of the beer is obviated by this apparatus, I seriously doubt; for though the durability of the beer while in the casks is considerably increased by the pressure of the carbonic acid gas, yet the latter by no means can exert any influence on the durability of the beer while in transportation.

We "kraeuse" our beers while in the shavings casks, not only in order to increase the ingredient of extract—to infuse more life (effervescence) into the beer, but also in order to quicken the clarifying process by the overflowing of the "kraeusen." Inasmuch as the beers, to which this bunging apparatus is applied, do not overflow after the "kraeusen" is added, it is questionable if all kinds of beer will become bright, even if the bunging is done, as usual, with fining material. On the other hand, I do not deny that a less amount of kraeusen will be required to accomplish the purpose of permanently securing the effervescence by means of the pressure of carbonic acid gas.

In reply to a remark I made in the last issue of this paper, to the effect that the price of putting up this apparatus was too high, Mr. Bartholomae writes me that the apparatus is very compactly and substantially constructed, and that the disbursements incident
147 thereto are very considerable. Nevertheless, I believe that the latter are entirely out of proportion to the former. Such

inventions and apparatuses must recommend themselves by the cheapness with which they can be acquired, and must become profitable to the inventor by their general introduction and use.

(Then follows a list of prices.)

5. A certain periodical, entitled "The American Beer Brewer," by A. Schwartz, New York, June, 1879, and offers to read therefrom an article on "The Bunging Apparatus of the Present," a translation whereof is hereto annexed, marked "Complainant's Exhibit No. 5."

COMPLAINANT'S EXHIBIT NO. 5.

(From "The American Beer Brewer," New York, June, 1879.)

By A. SCHWARTZ.

"The Bunging Apparatus of the Present."

In a Chaldaic didactic-philosophical work the question is propounded, Who was the first inventor of the wheel? And the remark is added that it was an easy thing to construct a wagon with four wheels, after the wheel had been invented.

While the names of many inventors are enrolled in golden letters upon the pages of history, the names of the discoverers of original tools, apparatuses, and mechanical appliances have never been mentioned, and a grateful humanity has been spared the trouble to erect costly monuments over their graves.

Would not the man who has invented the bunging of beer deserve a place of honor by the side of the masters of science? His name is unsung, nor does it appear in heroic verse, and, notwithstanding the most thorough historical research, we shall never be able to glorify him in the history of beer.

I believe the bunging of beer, like so many other happy and valuable discoveries, was the result of accident.

Possibly some one in the hoary ages (the Jews and Phœnicians are said to have been excellent brewers of beer) sent a crowned head a vessel filled with a fermenting sweet liquid, and closed air-tight. Upon its arrival at its destination, on being opened, a terrible detonation was experienced. The liquid which remained in the vessel had assumed an entirely different character, and an Egyptian magician, to whom the case was referred for investigation, explained to the satisfaction of the prince that the explosion was caused by liberated carbonic acid gas, which had been generated in the vessel by the continued fermentation! About the beginning of the nineteenth century a learned brewer deciphered this Egyptian opinion upon a papyrus scroll accidentally discovered, and has since introduced the bunging of beer to practice.

We bung the beer in the cask in order to give the carbonic acid gas, formed in the after fermentation, no opportunity to escape—to hold it bound in the beer—and to secure to the beverage a refreshing taste. In our case the carbonic acid gas is a product of fermentation. It develops from the moment the ferment begins the process of decomposing or disintegrating the extract. A great deal

of carbonic acid is formed during the fermenting process; 100 weight-units of sugar furnish about $\frac{4}{5}^{0}$ weight-units of carbonic acid. The carbonic acid formed during the main fermentation is mostly lost, and hardly half of it is retained absorbed in the beer. The lower the temperature of the slowly fermenting beers, the larger the ingredient of carbonic acid. Its relative quantity, however, by no means determines what we call "retaining the effervescence" of the beer. This depends upon the greater or less quantity of the carbonic acid gas bound in the beer, and scientists upon the question widely differ whether the binding medium for the gas is dextrine, peptone or parapeptone, or resinous, tanic, albuminous substance. It cannot be said that the carbonic acid enters into any chemical combination with any of the substances named, else it would not so readily become disengaged from such combination by mere
148 mechanical agencies.

The carbonic acid is generated in form of gas in the fermenting process, and remains partially absorbed as a gas in the beer. Therefore, before I come to consider the bunging apparatuses, it will be necessary to advert to some physical phenomena which are exhibited in the absorption of gases and in their expansion, as well as to certain physical laws which obtain in connection therewith.

The union of a gaseous substance with a liquid or a solid body is called gas absorption. It is a physical combination, if the quantity of gas absorbed constantly varies with temperature and pressure. The quantity of gas which a body can absorb, under given conditions, reaches a maximum, at which the absorbing body is saturated. The quantity required to saturate depends, firstly, upon the nature of the gas and of the absorbent; secondly, upon the temperature (at higher temperatures less gas is absorbed than at lower); thirdly, the pressure under which the absorption takes place is of material influence in respect of the quantity of gas absorbed. The quantity of gas which a liquid has the capacity to absorb at a uniform temperature is proportionate to the amount of pressure under which the gas is placed.

In case the partial pressure under which a liquid has become saturated with gas becomes diminished gas will escape from the liquid until the quantity still remaining absorbed is proportioned to the partial pressure prevailing. If the partial pressure is increased an additional quantity of gas will be absorbed.

According to Bunsen, one volume of water at a temperature of 20°C. absorbs 1,6481 volumes of carbonic acid gas, and alcohol, at the same temperature, 4,1466 volumes of gas. Although no experiments have yet been made respecting the capacity of beer to absorb carbonic acid gas, we shall not materially err if we assume it to be very high and fix the relative units of volumes at 2,328. In beer we have to deal with a gas that is not introduced into the liquid, but is generated in it; there is, therefore, always an abundant supply on hand, and there the absorption depends upon the two factors mentioned—temperature and pressure.

Since the introduction and universal use of ice-houses above ground, the *modus operandi* in the affairs of the cellar has become

materially changed. The method practiced for many years, to leave beers 5–6 month in the cellars and there to bung them, and to draw them off from the sedimentary yeast has been given up, and in the largest brewing establishments the following rational course has been adopted: The fermented beers are brought into lager or ruh casks, placed in refrigerating rooms. There the beer is allowed to rest awhile (whether "kraeused" or not, is irrelevant here); then it is pumped into shavings casks and mixed with young beer—*i. e.*, it is "kraeused" and got ready for bunging and drawing off. In case the beer was lagered (stored) at a temperature of 3–4° R. and the locality, where the "kraeusen" is conducted is correspondingly cold, a loss of absorbed carbonic acid gas will ensue only in a mechanical manner, when the carbonic acid during the kraeusen stage flows off with the foam or cap formed at the bung-hole.

How large a quantity of carbonic acid gas, expressed in figures, is absorbed by the beer during a slowly progressing after fermentation in very cold vaults can only be determined approximately, according to the above hypothesis; but that, under this condition of a very low temperature, no carbonic acid gas is lost is proven by the beer itself, which, although drawn off while unbunged, develops a fine effervescence, an abundance of carbonic acid gas. For this reason I have very frequently recommended the drawing off of unbunged beer, which is especially better adapted to distant transportation than bunged beer. Nevertheless, the practice
149 of bunging has been once established here and cannot be abolished, notwithstanding all arguments and reason that may be urged against it. In order to enhance the pressure under which the bunged beer rests, the so-called "air-bunging" was introduced, a practice that has proven very successful. An air-faucet is driven adjacent to or through the wooden bung, through which ordinary or refrigerated air is pumped upon the beer under a pressure of 8–10 pounds, by means of an air-pump. In drawing off, the hose connected with the air-pump is screwed to the male screw of the air-faucet, and the drawing off takes place with higher or lower pressure, according to the strength of the casks. An improvement of this *modus operandi* is intended to be effected by a bunging apparatus, patented by Mr. Meller, of Ludwigshafen, which patent Mr. George Bartholomae, of Chicago, has acquired, and which apparatus has been introduced in several large breweries under the name of "Bartholomae's bunging apparatus."

The readers of this paper are pretty well acquainted, from repeated descriptions, with the construction of this apparatus, and it would be superfluous again to enter upon a detailed sketch of it. The primary object which the inventor intended to accomplish was to impart more life to the beer, which is not "kraeused," by means of artificially generated carbonic acid gas, and to distribute this carbonic acid gas equally upon the casks through a conduit connecting with all of them; this equal saturation of the beer in the casks is controlled by means of a counter-pressure exerted by a column of water. Mr. Hofmann, a brewer at Mannheim, was the first one who

made practical use of this apparatus, and has achieved very favorable results by it.

Now, inasmuch as our treatment of beer differs from that practiced in Germany, it became necessary in adapting the apparatus to things existing here to modify its application. Our beers are "kraeused;" by the kraeusen not only is the ingredient of extract increased, but such considerable quantities of yeast, all of the utmost vitality, are brought into the beer, that its after fermentation, especially in shavings casks, is very much accelerated, and the carbonic acid gas can be developed more rapidly and in larger quantities. This turbulent development of carbonic acid gas in large quantities makes the artificial production of it dispensable, whilst on the other hand (in Germany) it seems to become necessary to impregnate very flat ruh beer or lager beer, when designed for immediate sale, with artificially produced carbonic acid gas under hydrostatic pressure.

The directions given by the patentee or his agents for the proper use of the apparatus have no universal application. He who would make use of it, must bestow a lengthy and attentive study, not so much upon the apparatus as upon the beer to be treated by this new method. Here the order is: Pay close attention how much kraeusen beer you take, when to fine, and when to apply the apparatus. Nothing short of a beer uniformly brewed can yield satisfactory results by uniform treatment.

The great advantages of the apparatus can no longer be denied. It is a safe protection for the casks; it facilitates maintaining cleanliness in the vaults; it enhances the absorbing capacity of the beer for carbonic acid gas by means of hydrostatic pressure, and by means of this constant pressure, which permits the slow escape of superfluous unabsorbed carbonic acid gas, it enables the brewer at all times to keep bunged beer in store for a considerable time.

I must protest, however, on ground of the physical laws above alluded to, against the assertion that an equalizing of carbonic acid takes place, although beers may be unequally "kraeused" or subjected to varying temperatures—*i. e.*, that notwithstanding all this, the several casks attached to the apparatus will show the same degree of life. If, for instance, two casks, A and B, which are filled with ruh or lager beer of a temperature of 2° R., and two shavings casks, C and D, of kraeused beer of a temperature of 5° R. are attached to the apparatus, no uniform and equal degree of effervescence will be developed in all the casks in a given period of time. A and B will not, until the end of 14 days, contain the quantity of absorbed carbonic acid gas which C and D will contain at the end of 4–5 days. In this matter temperature, pressure, and kraeusen are the controlling factors. The surplus of carbonic acid gas developed in C and D cannot be given to A B by any retroaction of the pressure exerted by the water column. If A were directly connected with C, and B with D by means of a hose, then an equalization of the gases and their even absorption might more readily take place. I have made this experiment with beer in bottles, and by repeated trials found my views confirmed.

Nevertheless, the other advantages of the apparatus must remain

unassailable. Detracting therefrom, however, the greatest draw-back has hitherto been the costliness of the contrivance. If the patentee would conclude to so reduce the prices that they would be in keeping with the actual value of the component parts used in the construction of the apparatus, there would be no doubt that this bunging apparatus would be generally introduced in large and small breweries.

Mr. M. Pfaudler, of Rochester, has obtained a patent upon an apparatus called the "Excelsior pressure regulator," constructed upon the same principles, only with some mechanical improvements, which, while omitting the artificial carbonic acid generator, affords the same advantages as the apparatus before referred to.

I doubt not there will soon be a severe contest between these two patentees, each of whom claim priority of invention and adaptation. The patent granted May 20th of this year to Meller and Hoffmann (No. 215,679) embraces eight "claims," which are very comprehensive, and may exclude even the use of a common bung with a valve.

Besides these apparatuses adverted to others have appeared in the market very lately, to which the name of "bunging apparatus" is also applied, but which are nothing other then safety-valves working more or less effectually. The bung invented by Dr. Bersch, called by him "automatic fermenting bung," closes the cask air-tight like every ordinary wooden bung, and by weights imposed produces a greater or lesser pressure in the cask, and permits the escape of carbonic acid gas in case of excessive pressure. It is indeed automatic—*i. e.*, it works entirely at the pleasure of the carbonic acid gas.

Pohl's bung, improved by A. Zoller, is likewise only a good safety-valve, which, when properly handled, facilitates a uniform bunging of beers subjected to uniform treatment, but is confined in its operation to single casks. The "bunging apparatus" patented by Otto Zwietusch, of Milwaukee, works in the same way as the two last mentioned, except that the superfluous carbonic acid gas, which is not confined by the pressure, escapes in the form of bubbles through a glass cylinder, filled with water, whereby an excess of pressure or an increased tension or expansion of the gas is made easily visible.

The newest bunging apparatus, invented by Emil Zech, of Staten Island, I will discuss in my next article.

If the brewer considers all the advantages together which are promised him by each individual inventor of a bunging apparatus, he is justified in the belief that by the use of the apparatuses a good beer, rich in carbonic acid gas and retentive of effervescence, can be produced in all cases; but after a few practical experiments he will be converted and brought to the conviction that he must not omit his industry and the attentive treatment of the
151 beer, and that the best bunging apparatus cannot afford him any absolution for the sins committed in the process of brewing and fermentation; and he will furthermore find my views confirmed, that it is not the quantity of carbonic acid gas developed, but that absorbed by the solid extract ingredients in the beer, that makes

the retentiveness of the effervescence in the glass. In this absorption the physical laws alluded to will be found to be of the utmost importance.

The examination of the witness was then continued:

Q. 31. I desire, for the better understanding of the court, to have you define certain technical terms which occur quite often in the books and in the language of experts. For example, what is "kraeusen" or "kraeusenber?"

A. Kraeusen is a fermenting sweet beer wort obtained during the first stage of the main fermentation, in which a foam of a very dense, curly, white appearance is formed on the surface; hence the German word "kraeusen," which means curls.

Q. 32. Can you define what "kraeusen stage," in shaving casks means?

A. It is that new fermentation which sets in after the "kraeusenber" has been added. It is caused by the yeast-cells of the kraeusen material. Gradually this new fermentation becomes so lively that foam floats out of the bung-hole for a longer or shorter time, depending upon the strength and quantity of the kraeusen as well as of the quality and quantity of the kraeusen yeast—say from three to eight days and longer. Gradually it reaches its maximum and falls back, the bubbles of the foam becoming larger and less frequent. The visible kraeusen stage sets in, according to the quality and quantity of the kraeusen, in about two days.

Q. 33. What is the reason that it takes about two days for the kraeusen stage to begin after the kraeusen is added?

A. The reason is that the kraeusen beer is mixed with older beer of a lower temperature and of less extract or nutriment, whereby the activity of the yeast is weakened accordingly.

Q. 34. What do brewers call this intermission between the addition of the yeast and the visible stage of fermentation?

A. We have no technical term for this intermediate time between the adding of the kraeusen and the commencement of visible life, but the moment you see foam coming out of the bung-hole, then the kraeusen is said to have commenced its "grip."

Q. 35. Now, do I understand you to say that when the liquid shows visible marks of the yeast having commenced to work then the kraeusen stage begins?

A. The kraeusen stage begins as soon as the kraeusen are added to the beer, but the new fermentation caused by the kraeusen material is not visible; still, it commences as soon as kraeusen are added.

Q. 36. Now, where does the kraeusen stage in shavings casks end, if there is any definite time drawn. Does the liquid not continue to ferment for a number of days after overflowage has ceased?

A. There is no definite line drawn. As sometimes the term is used the kraeusen stage in shavings casks sets in when the foam shows at the bung-hole, and it ceases with the overflowing of the foam and the diminishing of such manifestations, but, in fact, the kraeusen stage sets in at the moment the kraeusen are added to the

beer, and it continues until the kraeusen have answered their main object and the clarification of the beer is complete.

152 Q. 37. The term "kraeusen stage in shavings casks" is comparatively a new one, is it not?

A. It is—that is to say, it has been in general use in breweries since about fifteen years, and particularly in this country; it followed the introduction of shavings casks, which are comparatively a modern progress in this country.

Q. 38. Define, if you please, what is understood by "main fermentation" and "after fermentation."

A. The "main fermentation" is understood to be the very lively or violent fermentation of the cooled sweet wort in open tubs; "after fermentation" is the fermentation of the beer when in unbunged casks. Beer is always expected to be in a state of fermentation, even in corked bottles, but when we speak of after fermentation it is that stage which follows every violent fermentation, and gradually becomes so slow and reduced that no visible sign manifests itself to the naked eye. The term as used in brewing is applied usually to the beer in the storage or other unbunged casks.

Q. 39. What are shavings casks?

A. Generally speaking, shavings casks are those in which the ruh beer is finished and made ready for market; they got their name from being partly filled with shavings, such as beech, hazelnut, or birch-wood; these shavings are used to accelerate the ripening and clarification of the beer.

Q. 40. Why do they so operate?

A. They operate by their pórosity as well as their roughness of surface, holding the yeast, impurities, and gelatinous matter so that they may not readily rise again in the liquid and cause the beer to become turbid.

Q. 41. At what stage of the manufacture of beer was such shavings casks used?

A. Generally from eight days to four weeks before the beer is expected to be put in market.

Q. 42. Define the kind of fining material generally used in brewing, its object and operation.

A. Generally isinglass is used, but at times also gelatine. The object of using such material is to hasten the clarification of the liquid. It is applied in a dissolved state or in a state of very fine division; it operates by forming, by the influence of the alcohol, a kind of network, and is apt to sink and settle, so taking with it all suspended impurities. This network tends to keep the impurities together, and having carried them downwards causes them to adhere more firmly to the shavings.

Q. 43. Explain shortly the difference between lager (summer) and young (winter) beer.

A. In the United States especially, where it is desired to brew rapidly, lager beer has been pretty much done away with since the introduction of ice-houses, by which the brewer is enabled to make beer all the year round and almost an even temperature. The beer that we drink may be generally called young beer. The lager beer

of old was brewed stronger and allowed to work and settle considerably longer. Lager casks were filled a little at a time, younger beer was gradually added and much time allowed for after fermentation. The process consumed months. The article by Dr. Stahlschmidt, which has been introduced in this case, covers the difference between lager and young beer and their mode of treatment fully.

Q. 44. Referring to the state of the art in brewing prior to the adoption and use of shavings casks proper, what was the
153 object of drawing the beer into ruh casks and what further process had the liquid to undergo therein before it became ready for market? Give us a short explanation in what condition the liquid came into the storage or ruh casks, what was needed, what was done, and what the object of such treatment was. Confine yourself to young beer.

A. The beer having undergone the main fermentation, was brought into ruh casks, more or less green—that is to say, containing some suspended yeast yet—so that it would therein undergo a mild after fermentation and become afterwards settled and clear. According to the quantity of yeast still suspended in the liquid, it commenced to ferment again somewhat lively, in from twelve to forty-eight hours. This after fermentation manifested itself by foam flowing from the bung-hole. The object of allowing such beer to overflow was to have it liberated from impurities, surplus yeast, etc., which otherwise would hinder the clarification, and in order to aid the clarification finings were afterwards added.

Q. 45. When were these finings used?

A. They were generally used when the overflowing of the foam had ceased, and not until the beer permitted the sinking of the gelatinous matter.

Q. 46. You mean to say at a time when the sediments and finings, in their tendency to sink, found less resistance by ascending gases?

A. Yes, sir; the clarifying process was intended to be accomplished, first, by overflowage, and, secondly, on the principle of gravity, by the aid of finings. Both processes answer substantially the same purpose, but were successive steps.

Q. 47. Now, did not all this take considerable time?

A. According to the quality and age of the beverage, quantity of impurities, etc., it took from a fortnight to a month, more or less, with young beer.

Q. 48. And after that time did the liquid still ferment?

A. It did; but ordinarily it showed no visible marks of fermentation to the naked eye.

Q. 49. What was the next step, Mr. Ruschhaupt, in the treatment of young beer and its preparation for market?

A. The cask was bunged or closed tightly with a wooden bung for about four to eight days before the beer was expected to be used. Thus the beer was made lively or sparkling; what little carbonic acid gas was still generated could not escape and was withheld by the increased power of solution. As a matter of course, the beer during all this time was kept at a very low temperature, by which aid the absorptive power of the beer is increased accordingly. As

the beverage showed draft or life enough it was tapped or drawn off into kegs.

Q. 50. What dangers or drawbacks were experienced of old when so bunging with a wooden bung tightly?

A. Casks frequently burst by overpressure of gas if not drawn off in time; again, if the beer became charged with gas too much it filled the kegs with foam when the beer was drawn off for market. Brewers call this "overbunging." To avoid all this the bung had at times to be loosened, but then came in the danger that by the sudden escape of the gas the sediments in the cask would rise again and cause the beer too become turbid

Q. 51. State what improvements were made in the mode of bunging prior to the year 1876 and the foreign patents of Meller and Hofmann.

A. A great variety of safety-valves were introduced which permitted the gas to escape when the pressure within became
154 greater than the resistance of the valve. Habich's bung with an india-rubber strap was amongst the first ones that were used for this purpose. Gradually vents were used with springs. Hick's patent in the United States is a fair illustration of the later inventions, and so is Schlaudemann's. Valves were also used in connection with air-pumps for the purpose of drawing off the beer into the tapping kegs, the object being of preserving in the cask the same pressure and guarding against the rising of the sediments as the beer was gradually being withdrawn and the pressure consequently grew less.

Q. 52. To what time does the treatment of beer in shavings casks by the addition of kraeusen material date back?

A. In Europe shavings casks for such purpose are used but very rarely; in the United States their use is quite general since about fifteen years. I have stated already that since the introduction of ice-houses a desire prevails to brew quickly, and by the use of shavings casks another step in this direction is accomplished. The young beer is drawn from the ruh casks into the shavings casks, where a renewed or second fermentation is brought forth, the object being quickly to remove from the bung-hole, by lively fermentation and overflowage, the impurities in the beer, and when the fermentation has subsided the beer is fined and bunged as of old, with young beer, in the ordinary mode of treatment.

Q. 53. Do you know the Meller and Hofmann patent, No. 215,679, and when did you become familiar with their invention?

A. I do. I first heard of their invention about the spring of 1877, when their European patents were spoken of. Shortly afterwards Mr. Bartholomae introduced their invention into this country, and since 1878 it became generally known more and more, as all the brewing papers in the United States described it and commented upon it.

Q. 54. Have you taken occasion particularly to inquire into its provisions, specifications, and claims?

A. I have; and I have also seen the apparatus and process in operation quite frequently, watching its work with great interest.

Q. 55. Did that patent introduce or make known to the public any particular new feature aside from its mechanism or apparatus; if so, in what respect?

A. It indeed introduced a new feature. I will explain: It is an acknowledged fact that the influence of pressure upon a compressible object suspended in a liquid causes it to sink, and also that pressure in closed vessels is propagated to all sides with the same force. For this reason an ascending or rising of the insoluble impurities cannot take place as long as the pressure continues or increases; however, as soon as the pressure is released or diminished a rising must necessarily result. With beer especially such rising easily occurs, and the lighter impurities will almost at once be drawn into the beer again. Any apparatus which does not allow the pressure to become diminished at any time during the operation, and which is not apt to get out of order or become clogged, like a hydrostatic column, will avoid the drawbacks above referred to, and this object is beyond question fully accomplished by the apparatus patented to Meller and Hofmann. It is not simply a safety-
155 valve or vent, but intended to accomplish much more; and to be used, if necessary, in the height of the kraeusen stage. But not in this respect lies the principal advantages of said patent. Its new mode of treatment is the main thing. The patent recommends automatic bunging at an earlier stage of manufacture than before practiced, viz., during the kraeusen stage, and for an entirely different purpose, viz., to hasten the clarifying and settling of the beer. The patent suggests in this respect a new and different mode of treatment before the beer is clear and settled. The new process is carried into effect by causing the liquid in the cask to be placed under an even and equal pressure of carbonic acid gas, which is uniformly applied and maintained throughout the treatment up to the very time of racking off the beer by means of an automatically working valve or weight regulated at a prefixed standard of about seven pounds to the square inch.

The patent also recommends connecting a number or series of casks with each other, so that the gas may communicate from one cask to the other, and the fermentation be conducted under an entirely uniform and even pressure in all of them alike; the surplus gas from one keg will supply what may be wanting in others, and in consequence the settling and clarifying process in all of them will be more rapid, and in the end the effervescing character of the beverage will prove to be adequately even. By such connection of the casks at an early time of the kraeusen stage it may also be that the fermentation becomes more uniform; but I have not given the subject full examination.

Q. 56. The process of hastening the clarifying of the beer, as described in said patent, may be practiced by any apparatus working at all times truly automatically, may it not?

A. Yes, sir; any of the safety-valves to which I have alluded before, if capable of working at about seven pounds of pressure, could be used for the same purpose if it were not for their mechanical construction and their liability to become clogged and out of order.

When simply used after the kraeusen stage is over, for the purpose of confining the carbonic acid gas, they will then answer the purpose, as there will then be no foam coming in contact with them.

Q. 57. Now, as to the second part of the process covered by said patent, is there any particular apparatus needed to accomplish the same?

A. Any apparatus which, by means of pipes or other suitable connections, will permit the carbonic acid gas to flow from one cask into the other will answer the purpose.

Q. 58. Tell us, Mr. Ruschhaupt, whether, under the patent of Meller and Hofmann, it is essential that the kraeusen and finings be added at the same time.

A. No, sir; it is not essential, as I understand the patent, but left to the pleasure of every brewer. Neither is it necessary that the casks be bunged at once. If one desires to utilize the advantages of the patent to their full extent he had better add the kraeusen and finings simultaneously and bung when the gas begins fully to develop; but any mode of automatic bunging, when applied for this new purpose, namely, in order to bring about an even accumulation of gas in all the casks and a quicker clarification and settling at any time before the beer is clear and settled, is, in my opinion, within the patent.

Q. 59. Do you mean to say that the kraeusen and finings must be added at the same time in order to come within the patent?

156 A. Not at all; it is immaterial. The main feature of the patent is the early bunging before the beer is clear and settled.

Q. 60. Had any such process of early bunging or process of connecting the casks with a view of a more uniform treatment been used prior to said invention of Meller and Hofmann, or known to the art?

A. Not to my knowledge or belief. I have examined the books and publications bearing upon this question with considerable care, both in Europe and here, and I have not been able to find anything which detracts from the credit of such inventions prior to the year 1876, or thereabouts. All publications deal with the subject of bunging as having no other or different object than withholding the required amount of carbonic acid gas and charging the beer with carbonic acid to give it life and effervescence, and Profs. Lintner and Wagner, in their publications of 1877 and 1878, first speak of Meller as the inventor of this important process.

Q. 61. You consider, then, if I understand you, the processes suggested by Meller and Hofmann a decided progress?

A. They were a great progress, and presented many new features, as stated before.

Q. 62. Can you give me an explanation why such an automatic pressure when applied to closed casks during the kraeusen stage, or while the process is still in the process of fining, assists and aids in clarifying?

A. The pressure is propagated to all sides, and with the same force; all fixed and compressible subjects which are suspended in

the liquid will become denser, and consequently sink more rapidly. The so-called gluten will, by the same forces, be carried downward, partly under the influence of the finings, and in a proportionately short time a bright and clear beer will be the result. The carbonic acid gas in an open cask would naturally rise towards the bung-hole, and by carrying the sediment with it tend to keep the liquid turbid; but when the cask is bunged and the liquid put under pressure, all suspended impurities will naturally sink and the gas bubbles, although formed during the fermentation, will remain, it would seem, stationary in the liquid. The surplus gas which slowly may accumulate will find an easy outlet by the automatic action of the hydrostatic column without disturbing the arrived static momentum of the liquid in the cask.

Q. 63. Have you formed any opinion whether, by the use of this process, any time and labor can be saved?

A. Time and labor are saved. Time, because the clarification is hastened, and labor, because no washing of the casks, as the result from overflow, becomes necessary; and the apparatus, when once fixed, requires no further attention, as it may be fairly expected to work truly automatically.

Q. 64. What about the saving of kraeusen or fining material?

A. I have made experiments, and found, as I expected, that both materials may be considerably saved. Carbonic acid gas will always be sufficiently on hand to give life to the liquid; and as the pressure itself accelerates the clarification very much, a small quantity of finings will suffice, and may even at times be wholly dispensed with.

Q. 65. What about the effect of the process, if any, upon the product—the beer itself?

A. The beer will contain a proportionately larger amount
157 of extract as well as carbonic acid. There will be less yeast in it (being in a microscopically small state). In consequence the beer will keep much longer and show more brightness and a better taste.

Q. 66. Will not the fermentation and decomposition of sugar be more or less retarded by putting the liquid at this early stage under a pressure of carbonic acid gas removed from atmospheric contact and foul corrupting influences, and will not this exert some influence upon the nutritious qualities or character of the beverage?

A. By an early appliance of the apparatus the fermentation will most certainly be retarded to a certain extent, and the beer in consequence thereof will retain a proportionately larger amount of nutritious constituents. As the yeast will be much less active it cannot consume so much of the albuminous matters (peptones) and phosphates, which are so highly important in the matter of nutrition, thus adding very much to the value and quality of the beverage.

Q. 67. Have you read the defendant's evidence in this case?

A. I have.

Q. 68. While reading and studying the same, has anything come under your observation therein which causes you to change any part of your testimony heretofore given?

A. I have not the slightest idea of changing my testimony as given heretofore.

Q. 69. Will you please give us your views shortly as to the testimony of Dr. Jameson?

A. My view is that Dr. Jameson has merely read up the subject relating to the art of brewing, and that he in particular is not familiar with the details of fermentation of beer as practiced in breweries—not with the peculiarities of the modern improvements in brewing. He, for example, is of opinion that Meller and Hofmann's apparatus is merely a contrivance for preventing the bursting of the casks and for charging the beer with a proper amount of carbonic acid, and he is not aware that said apparatus has several other and most important objects in view. He does not know that said apparatus involves early bunging, and that by the process so executed the clarification is promptly effected and under control. He believes that all so-called automatic vents and valves, either working by springs or levers and weights, and so forth, will answer the same purpose as Meller and Hofmann's apparatus, and is therefore not aware that such vents, valves, and so forth, frequently get out of order by clogging, for example, or, in fact, that a thoroughly automatic apparatus regarding this subject is and can only be the hydrostatic column.

Q. 70. Will you please give us your views shortly as to the testimony of Jacob W. Loeper?

A. Loeper does not know anything more in regard to bunging than Dr. Jameson, and is therefore laboring under the same grave mistakes.

Q. 71. What do you say as to the apparatus which Loeper describes?

A. The apparatus he describes is very imperfect and is frequently apt to become clogged, and therefore not to be denominated as working automatically.

Q. 72. Can you tell us, from Loeper's testimony, what said apparatus was used for—what class of bungs it belonged to?

A. It was for the purpose of retaining gases in beer in closed casks during fermentation. It belongs to the same class of common vents and valves, and so forth, as those mentioned before.

158 Q. 73. Could such vents, as described by Loeper, be used to advantage during the "kraeusen" stage?

A. They can be used during the "kraeusen" stage if properly watched and kept clean.

Q. 74. Will you please give us your views, shortly, as to the testimony of Frank A. Maus?

A. Mr. Maus is also mistaken in expressing that vents, as described by Hicks, will answer the same purpose as the apparatus of Meller and Hoffman, because Hicks' apparatus will be much more apt to get out of order than any similar apparatus not worked by springs. The spring in Hicks' apparatus will, under the influence of carbonic acid and moisture, get rusty and become useless. His testimony is furthermore not correct in so far as he believes that the Wallace apparatus would produce the same result as that of Meller and Hof-

mann's, for the former, if applied to beer casks under circumstances as described, would not produce sufficient pressure to retain the proper amount of carbonic acid.

Q. 75. What do you mean by your last answer? Am I to understand that the Wallace apparatus, as shown in his patents, could be used for any purpose in brewing and clarifying the beverage, leaving out of the question the insufficient pressure which you spoke of?

A. As soon as the Wallace apparatus is applied to beer casks, and the pipes from one cask conducted to the bottom of another, then it could not be used at all.

Q. 76. Why not? What is the difference in this respect between beer and whisky mash?

A. It would stir the yeast and impurities from the bottom instead of accelerating the settling of the same, as it has to be effectuated in beer casks. The difference is as great as that between day and night. A whiskey mash is a mixture of malted grain and water, while beer is a liquid containing water, malt extracts, alcohol, and carbonic acid. A whiskey mash is mixed with yeast to have it fermented, and the mixture is frequently stirred up to prevent the settling of the yeast, and thus effectuate a quicker fermentation.

Q. 77. How does the Wallace patent contemplate stirring up of the yeast in the mash?

Objected to as incompetent.

A. By conducting, as I stated before, a pipe from the upper part of one cask to the bottom of another, and thus allowing the carbonic acid gas from the former to enter the liquid of the other, and to pass in form of a multitude of gas bubbles through the liquid.

Q. 78. Is it not true that carbonic acid gas is developed in the fermentation of liquids, and unless put under pressure in closed casks or vessels, is frequently called "the bearer of turbidness?"

A. It is.

Q. 79. Why is this so?

A. As it is of much less specific gravity than water it will quickly ascend from the bottom to the surface, and thus carry with it the yeast and impurities from the bottom.

Q. 80. State whether the principle and process embraced in the Meller and Hofmann patent is in any way or manner similar to the principle and process covered by the Wallace patent.

159 A. The principle and process of both patents are not essentially the same. In that of Meller and Hofmann the fermentation is regulated under a pressure of about seven pounds, while in the latter patent the said regulation is under a much lower pressure. In Meller and Hofmann's the object in view, at the same time, is to control the clarification, which in the other patent is not cared for at all. In the former, the amount of carbonic acid to be withheld in the beer is properly regulated, while in the latter this important object is entirely ignored.

Q. 81. Have you closely examined the testimony of Frank A. Maus and his brother Matthias as to the apparatus which they use at their

brewery; and, if so, is it materially different from the one covered by Meller and Hofmann's patent?

A. Excepting the use of the receptacle or cylinder, it does not essentially differ from Meller and Hofmann's apparatus. The defendant's apparatus, when properly applied and used, will produce the same results.

Q. 82. Have you closely examined said testimony as to the mode and manner of using said apparatus; and, if so, is the process, mode of treatment, and use of apparatus materially different from that suggested by Meller and Hofmann's patent?

A. I have closely examined said testimony, and come to the conclusion that they do not materially differ in applying and using their apparatus.

Q. 83. Do the defendants admit, in their testimony, the use by them of that part of the Meller and Hofmann process involving the connection between the casks and the transfer of gas and pressure from one to the other?

Objected to as incompetent.

A. I find in their testimony, page 25, the following statement: "Each cask is connected separately to the cylinder, and the gas from each escapes into the cylinder." The effect of connecting each cask separately with the receptacle or cylinder is that in case of a somewhat violent fermentation the foam, resinous parts, yeast, and impurities will collect in the water of said cylinder, but that is all the difference. But, while they use such connecting cylinders, the gas does not go from one cask to the other.

Counsel for defendants now protests before the examiner against the suggestions by Mr. Cotzhausen of answers to the witness, and insists that the witness shall be allowed to frame his own answers without any assistance.

Q. 84. Now, will you please answer my question as to whether, although such cylinder is used, a connection is not established between all the casks therewith connected, so that the pressure in all of them will be alike and the clarification evenly proceed?

Objected to—first, because it is leading in form; secondly, it is incompetent and irrelevant; thirdly, it has already been answered by the witness.

A. A connection is fully established between them; the pressure in all of them must consequently be fully alike, and the clarification will evenly proceed.

Q. 85. What, then, did you mean when saying that the gas could not go from one cask to the other?

A. I made a mistake in my answer, because I was for a moment under the impression that the receptacle was partly filled with water, which, however, is not the case; consequently, the gases from one of the casks have free access to the other.

160 Q. 86. Suppose, Mr. Ruschhaupt, the receptacle, as shown in the circular of the Wallace Improved Fermentation Co.,

was partly filled with water or other liquid, and that the pipes from the separate casks enter the cylinder on the top, as shown in the circular, and that the water column, as shown, exerted a pressure of seven pounds, more or less, would the connection between the casks not be fully established in the same manner as contemplated under the Meller and Hofmann patent, and just the same as if the cylinder were empty?

Objected to as incompetent and irrelevant.

A. The connection would be the same as in the Meller and Hofmann patent, with the slight difference, however, that some of the aromatic gases would, to some degree, be absorbed or dissolved by the water.

Q. 87. Have you examined into the apparatus patented by George Wallace and compared the same with the apparatus shown in the circular of the Wallace Improved Fermentation Co., which is attached to the defendants' evidence?

A. I have examined and compared them.

Q. 88. Do you find any points of similarity between the two or not?

A. I do not.

Q. 89. Will you please point out shortly a few of the characteristic differences between the patent of 1867 and the apparatus shown in the circular—first, in point of mechanical construction, and, second, in point of principle and uses?

A. First. In point of mechanical construction the Wallace patent describes an apparatus in which a pipe is conducted from one of the upper parts of the casks down to the bottom of the other, and *vice versa*, and a water-tank between for collecting or condensing surplus gases useful in distilling as alcoholic or aromatic gases. In the circular the apparatus shows no such constructive features at all; the pipes, with the exception of being connected with the receptacle, are arranged the same as those in Meller and Hofmann's, and, therefore answered the same purpose if applied as described.

Second. In point of principle the one will answer the objects in distilling, as stated, but will be entirely contrary to those in brewing, while in the apparatus shown in the circular the principle is essentially the same as that of Meller and Hofmann.

Q. 90. It seems, from the defendants' testimony, as if they considered the water column to be the essence of both the Wallace patent and the Meller and Hofmann patent. What do you say to that?

A. They are mistaken in such belief, because in the Meller and Hofmann patent the water column is not only suggested to serve as an automatic bung, but most materially as a means for accelerating the clarification, while in the Wallace patent the water column has to be used for regulating the fermentation as well as to collect useful volatile substances, such as alcohol, ethers, and other aromatics. The water column is the essence of both apparatus, but not in their uses and applications.

Q. 91. When you say that the Wallace water-tank of 1867, as

shown in the patent, regulates, among other things, this fermentation, what do you mean?

A. The weight of the water column in the Wallace patent
161 of 1867 counterbalances, to some extent, the current of the carbonic acid gas forced to pass through the liquids in the casks, and thus regulating the stirring up of the fermenting liquids, and at the same time the continuous contact of the yeast with the fermentable substance of the mash.

Q. 92. Does the pressure of the water-tank in the Wallace patent regulate the fermentation in any other way than by merely stirring up the fermenting mediums?

A. It does not.

Q. 93. And I understood you to say this morning that it was essential toward this purpose that the gas should enter at or near the bottom of the tank. Is that correct?

A. It is.

Q. 94. Have you examined the testimony of General Sturm given in this case?

A. I have.

Q. 95. The various mechanical devices which he speaks of, on pages 48 to 59, as having been constructed by him for various breweries about the year 1860, do they show or present any new features or principle heretofore unknown to you or to the brewing trade?

A. They do not.

Q. 96. Do they not all belong to that class of valves, vents, or automatic bungs which you spoke of yesterday as being used during the last stages of after fermentation?

A. They do.

Q. 97. Were any of the bungs by him described capable or susceptible of being used during the "kraeusen" stage in shaving casks, as contemplated by the Meller and Hofmann patent?

The last three questions objected to as leading in form.

A. They were not.

Q. 98. Call our attention to some of the reasons why not.

A. They were constructed to act under a much lower pressure than required and recommended by Meller and Hofmann's patent. Those on page 48 were apt frequently to get out of order by clogging and rusting of the springs; and that on page 50, with the mercury gauge, was intended to work under pressure of only about one pound.

Q. 99. Were those bungs, about the year 1860, when constructed and used, applied to anything else than lager beer casks?

Objected to as leading.

A. They were only applied in lager beer casks to prevent the bursting of the same—that is to say, to let off the surplus amount of carbonic acid gas.

Q. 100. I believe you have already stated, Mr. Ruschhaupt, that lager beer, toward the end, is in a very slow, if not imperceptible, fermentation, have you not?

A. I have so stated.

Q. 101. Have you examined the Hicks patent, Dietrichsen patent, Gilham patent, Schlaudemann patent, Straub patent, Frank Fehr patent, and Pfaudler patent?

A. Several of them I have examined, others not.

Q. 102. Have you seen or found anything in any of them which you examined that would seem to anticipate or detract from the invention of Meller and Hofmann, as testified to by you before?

A. I have not.

Cross-examination by Mr. Jacobs:

162 X Q. 1. Are you the Fred. Ruschhaupt advertised by the New Process Fermentation Co. in a circular issued over the printed signature of Otto Zweitusch as one of the company's experts and scientific advisers?

A. I am.

X Q. 2. How long have you been in the employ of that company?

A. I have only been in its employ as an expert in several patent cases.

X Q. 3. In what cases besides this one have you been employed as an expert by the complainant?

A. In the Baltz case (Philadelphia), the Mulhauser case (Baltimore), and this case.

X Q. 4. Do you know anything about any suits brought by the complainant in Milwaukee or the suit brought against Schlaudemann, of Decatur, Ill.?

A. I have only heard of them, but know nothing concerning them.

X Q. 5. Don't you know that shavings casks have been used in the United States for the last twenty years?

A. Yes.

X Q. 6. Do you not know that the regulation of carbonic acid gas in such casks by automatic devices was described in standard works on brewing before the year 1860?

A. I know that such devices had been described in standard works before 1860, but I do not know that shavings casks had been used before that time.

X Q. 7. Don't you know that the fermentation of beer had been regulated in fermenting casks by automatic devices in Germany before the year 1860?

A. I know nothing about the regulation of fermentation recommended by such devices before that year; I only read in books and periodicals that they were recommended for preventing the bursting of the casks.

X Q. 8. That is to say, the expanding pressure of the carbonic acid gas was utilized; that of its own force it would overcome a resistance and escape until the pressure of the gas in the cask became less than the resisting force?

A. That is correct.

X Q. 9. Is any device used for such purpose and substantially as arranged entitled to be called automatic in its operation?

A. It is in case and as long as its construction is not apt to get out of order.

X Q. 10. That is to say, as long as it operates it operates automatically?

A. Yes.

X Q. 11. Has form or imperfect construction anything to do with determining whether a device is automatic or not?

A. It has.

X Q. 12. What has it to do with it?

A. Imperfect construction will bring it soon out of order; consequently it will work no more.

X Q. 13. Then if a machine is well made its principle being automatic, if it be poorly made it is not automatic?

A. It seems to me that this question involves a contradiction.

X Q. 14. The machine is automatic in either case, isn't it?

A. I don't understand how it can be.

163 X Q. 15. Is the principle of a machine dependent on its form?

A. It is not.

X Q. 16. What is the mechanical difference between the resistance of a fluid or solid weight?

A. There is no difference between the two.

X Q. 17. What is the difference, mechanically, between the resistance of a weight and of a spring?

A. A spring is apt to loose its elasticity, and as this gives the resistance, it differs very much from the resistance of a weight, which will remain the same.

X Q. 18. Do you mean to say that the resistance of a weight is always the same in all mediums?

A. No; it is not always the same.

X Q. 19. Then, both being continuous, the resistance of the elastic spring and the ponderable weight are both the same, are they not?

A. They are.

X Q. 20. When you say that a device acts automatically, what do you mean?

A. I mean to say it works by its own action without any assistance from the outside whatsoever.

X Q. 21. In other words, that it is self-regulating?

A. Yes.

X Q. 22. Supposing an automatic device, contrived for one effect only, in experiment produces several, would you limit its function to the one it was contrived for, or allow it to include all it produced?

Objected to as calling for a conclusion of law.

A. I should allow it to include all.

X Q. 23. The comparative ease of working never affects the principle of a device, does it?

A. Under circumstances, it does.

X Q. 24. Give me an instance.

A. Device which may work very well in the air does not work well in substances of a sticky nature. A valve, for example, which may promptly act in air and some dry gases, will not answer the purpose as well when in contact with substances of an adhesive nature.

X Q. 25. But the principle upon which that valve acts is precisely the same in the one case as in the other, is it not?

A. It is.

X Q. 26. Then the ease with which a device works in one case and the difficulty which attends it in another never affects its principle of operation, does it?

A. It does not.

X Q. 27. A valve controlled by a spring will only resist in proportion to the strength of the spring, will it?

A. It will.

X Q. 28. If a valve be kept in its seat by a spring capable of resisting a pressure of ten pounds to the square inch, it will be lifted by a pressure of ten and one-half pounds, will it not?

A. It will as long as the spring is in good order.

X Q. 29. Then, if you want the valve to resist a greater pressure, you can effect this by putting in a stronger spring, can't you?

A. Certainly.

X Q. 30. Take a column of water a foot high and a foot square, and another column of water a foot high and two feet square, is there any difference in their resisting power; and, if so, what?

A. The difference is that the latter offers double the resistance of the former.

164 X Q. 31. Supposing you have a column of water a foot in diameter and three feet high in your tube, bearing by its gravity against a greater resisting force of gas, what will be the result?

A. If the diameter is proportionately small, the water will be lifted; if larger, the gas will escape in bubbles throught it.

X Q. 32. If you did not want the gas to escape, how would you prevent it? By pouring in more water?

A. It could not be prevented in that way. The gas will pass through the liquid in case the vessel containing the same is wide, no matter how high the column of water may be. I misunderstood the question. I should prevent the gas from escaping by raising the height of the column of water, irrespective of the diameter.

X Q. 33. In any case, the amount of water doesn't change the principle upon which the fluids act, does it?

A. It does not.

X Q. 34. What is the reason why fluids are more perfectly automatic in their operation than solids, in the cases I have mentioned?

A. The reason is, according to the law of Archimedes, that *if* a force acting upon a part of a fluid is distributed by the easy mobility of the molecules to all sides and with the same force, which is not the case with solids.

X Q. 35. That is, I understand you, fluids act better than solids,

in these cases, because their particles do not cohere, but move readily among themselves?

A. They do not cohere so closely among themselves, and do not adhere so readily to other substances.

X Q. 36. What is fermentation in brewing?

A. It is the decomposition of sugar and other substances of the malt, etc., into alcohol and carbonic acid and some few more substances, caused by means of the action of living germs in short yeast.

X Q. 37. As I understand you, after the wort has been boiled, it is placed in vats to be fermented, and this is begun by the addition of yeast to the mass?

A. That is so.

X Q. 38. This is the first or main fermentation?

A. Yes.

X Q. 39. After a time, when this fermentation has progressed to the satisfaction of the brewer, this new beer is called "kraeusen," is it not?

A. If the fermentation has passed to a certain degree, then he calls it "kraeusen" beer.

X Q. 40. The beer is then drawn off from these fermenting vats into casks, called "ruh" casks, the temperature of which is kept below forty-two degrees, is it not?

A. They never put the "kraeusen" beer in "ruh" casks; they only put beer into "ruh" casks after it has thoroughly undergone the main fermentation, and the yeast has become mostly settled.

X Q. 41. Any fermentation cannot take place when the temperature of the liquid is below forty-two degrees, can it.

A. Oh, yes; but slowly. The lower the temperature, the slower the fermentation.

X Q. 42. From these casks the beer is drawn off into the shavings casks, where "kraeusen" beer is added to produce a second fermentation, before the beer is fit for market?

A. At present it is generally done so.

X Q. 43. And this has been done ever since what are called shavings casks have been in use?

A. Yes; in shavings casks proper.

165 X Q. 44. What do you mean by shavings casks proper, and how long have they been in use?

A. Shavings casks proper are those which follow the "ruh" casks in the treatment of the beer; they have been used since about twenty years, here and there, but came into general use about fifteen years ago.

Recess taken at this point to October 11th.

OCTOBER 11TH, 1882.

Parties met and the cross-examination was resumed.

X Q. 45. The less the fermentation in a cask of beer, the less weight is required in the counterbalancing column, is it not?

Objection; question objected to as indefinite.

A. That is so.

X Q. 46. What is the difference in principle between the regulation of the pressure of gas in a closed vessel by the automatic action of water and mercury.

A. The difference is that a column of mercury, according to its higher gravity, need only be high enough in proportion to the gravity of water. A column of mercury of 30 inches will equalize about 32 feet of water.

X Q. 47. The specific gravity of a fluid or a semi-fluid has nothing to do with the principle I spoke of, has it? Whether it weigh little or much, the principle is the same, is it not?

A. It is.

X Q. 48. What different principle is involved in the automatic regulation of gas in a closed vessel by the elasticity of a spring, from that where such pressure is regulated by the weight of a fluid substance?

A. No difference — principle is involved.

X Q. 49. You said, I think, that it was in 1877 that you learned of Meller and Hofmann's foreign patents?

A. I did.

X Q. 50. From whom did you learn about them?

A. I read about them in periodicals.

X Q. 51. When, if ever, did Mr. Bartholomae first speak to you on this subject?

A. I do not remember exactly; I guess it was about two years ago.

X Q. 52. Did you ever see or read any of the letters patent issued in foreign countries to Leo. Meller & Co., mentioned in the bill of complaint?

A. I did not. I only saw those issued in this country.

X Q. 53. Did you ever examine a copy of the drawings and specifications of the United States letters patent No. 201,982, issued to George Bartholomae April 2, 1878?

A. I did.

X Q. 54. When was that?

A. I believe it was last year. It might have been before that.

X Q. 55. You say in your answer to the 80th question that the apparatus of Meller and Hofmann is intended for a pressure of seven pounds, if I understand you. Where do you find that in their patent?

A. I find it in their patent on the first page, second column, and second paragraph.

X Q. 56. Would that pressure be advisable for the beer in all of its stages?

A. It would not.

X Q. 57. Only in the stage referred to?

A. Yes, sir.

166 X Q. 58. You say in your answer to the 80th question that the Wallace apparatus requires or recommends a lower pressure

than seven poundes. Where do you find that in the Wallace specifications?

A. I do not see it mentioned in the specification, but I see it from the construction.

X Q. 59. Then there is nothing in the amount of pressure required in either case that affects the principle of automatic operation?

A. It does not.

X Q. 60. In the Wallace apparatus, referring to the water-tank C, the pressure of the water in that tub upon the gases in the tanks A and B depends upon the height of water in the vat C, does it not?

A. It does.

X Q. 61. And the more water there is in that tank the heavier the pressure of the gas in the fermenting vats, is it not?

A. Not the more water, but the higher the water.

X Q. 62. Is gelatine necessary in clarifying beer?

A. Sometimes it is, sometimes not; it depends entirely upon the kind and quantity of impurities present in the beer and the time in which the beer has to be made ready for market.

X Q. 63. Which will first become clear, a solution that is agitated or one at rest?

A. Regarding beer, it will only become clear when at rest.

X Q. 64. And the less violently it is agitated the quicker the impurities will settle and the beer become clear?

A. It will.

X Q. 65. Referring to the Wallace patent again, do you find in it a tank for containing water?

A. I do.

X Q. 66. Do you further find in it a closed vat for holding beer during fermentation, with a pipe leading from such closed vat for discharging gases into the water contained in the tank?

A. I do.

X Q. 67. Do you further find that such fermenting vat is connected with another fermenting vat by suitable pipes and cocks, whereby the surplus gas arising during fermentation in the one may be discharged into the other?

A. I do.

X Q. 68. What office does the water in Wallace's water-tank perform when the apparatus is in practical operation?

A. It regulates the pressure in the closed casks.

X Q. 69. Referring now to the circular of the Wallace Fermentation Company which has been exhibited to you, you will see on the first page a cut representing a series of casks lying on their sides, and on the second page a series of vats standing on their bottoms. Does it make any difference in the regulation of pressure by the water column whether the casks lie on their sides or stand on their ends?

A. It does not.

X Q. 70. Referring again to this circular and the cut thereon

showing the vats in an upright position, do you find in that apparatus a tank for holding water?

A. I do.

X Q. 71. Do you also find one or more closed vats for holding beer during fermentation?

A. I do.

X Q. 72. Do you further find a pipe leading from these
167 closed vats for discharging gases into the water contained in the tank.

A. I do.

X Q. 73. Do you further find that these closed fermenting vats are so connected with each other by suitable pipes and cocks that the surplus gas arising during fermentation in the one may be discharged into another?

A. Yes, sir; I do.

X Q. 74. What office does the water in the tank shown in this circular perform when the apparatus is in practical operation?

A. It produces a regulation of pressure inside the closed vats or casks.

X Q. 75. Referring now to the drawings of the Meller and Hofmann patent, dated May 20, 1879, do you find in the apparatus there shown a tank for containing water?

A. I find a cylinder—you might call it a tank—I find a cylinder forming a vessel for containing a column of water of a certain height.

X Q. 76. What is that certain height required by the Meller and Hofmann patent of which you speak?

A. It is a column of water which will resist a pressure of about seven pounds to the square inch.

X Q. 77. Referring again to the drawing of Meller and Hofmann, do you further find in it one or more casks for holding beer during fermentation with a pipe leading from such casks for discharging gases into the water contained in the tank?

A. I find several casks said to contain beer in the last stage of fermentation with pipes connected in such manner as you describe in your question.

X Q. 78. Do you furthier find that such fermenting casks are so connected with each other by suitable pipes and cocks that the surplus gas arising during fermentation in one may be discharged into another?

A. Yes, sir; I do.

X Q. 79. What office does the water in this tank perform when the apparatus is in practical operation?

A. It regulates the amount of pressure in such closed fermenting casks.

X Q. 80. Is the principle of the automatic regulation of the pressure of gases in closed vessels by suitable counter-balances the same whether one fermenting cask or more be used?

A. It is the same.

X Q. 81. In your answer to question 51 do you mean to be under-

stood that either the Hicks or Shlaudemann automatic vent-bungs required the use of air-pumps with them?

A. I do not.

Redirect examination by Mr. DYRENFORTH:

R. D. Q. 1. You have stated in one of your answers on the cross-examination that the vats A and B in the Wallace apparatus are for containing beer. Is that your understanding?

A. It is according to the description of the specification of the patent, in which I find the words that the machine is for regulating vinous fermentation in malt and other liquors, and that word includes beer also.

R. D. Q. 2. That is the only reason that you gave that answer then, is it?

A. It is.

R. D. Q. 3. You have also stated in answer to a question
168 on your cross-examination that the pressure produced upon the water in the tank C would depend upon the height of water in that tank. Is it not a fact that the pressure would not depend upon the height of the water in the tank C, but rather upon the depth which the pipes G go down into that water?

A. Most certainly it is.

R. D. Q. 4. Look at the drawing of the Wallace patent, No. 62581, and tell us how far the pipes appear to go down into the tank C.

A. I cannot state that from the drawing. I cannot see how far or how deep the pipe goes into the water of said tank.

R. D. Q. 5. Can you not see where the left-hand one stops?

A. I cannot.

R. D. Q. 6. Does not the drawing show the lower end of that pipe G?

A. It shows, according to my opinion, the end of the pipe so far as it will enter the water, although I do not see the water-mark.

R. D. Q. 7. If that was not the lower end of the pipe G, could you see the dividing line of the staves behind it?

A. I could not.

R. D. Q. 8. Then what is your opinion now as to the depth to which the left-hand pipe G extends down into the water of the tank C?

A. My opinion is that the drawing is imperfect and does not enable me to judge fairly as to the extent to which the pipe G extends into the tank.

R. D. Q. 9. Judging purely from the drawing, should you think that the left-hand pipe G extended down into the tank C more than a few inches?

Objected to by defendants' counsel for the reason that the question requires the witness to ignore the description given in the specification, whereas both drawing and specification must be taken together.

A. I would not.

R. D. Q. 10. Examine the Wallace specification, particularly the

description of the two-way cocks H and pipes E, F, and G, and tell me whether it is possible for the gases to pass from one tank to another and at the same time pass by way of the pipes G into the tank C?

A. I have examined the Wallace patent again and have to state accordingly that while the passage of the gas from one closed cask to the other is going on it cannot pass at the same time into the vat or tank C. This is so because of the two-way cocks, which will only allow one passage at a time. If the surplus gas is intended to pass the water in cask C then the cocks have to be handled accordingly.

R. D. Q. 11. In the use of the Wallace apparatus, as described in that patent, would the flow of gas into the water be continuous, as it would in the Meller and Hofmann apparatus?

A. It would not.

R. D. Q. 12. Would it only take place from time to time?

A. It would.

R. D. Q. 13. Now, Mr. Ruschhaupt, from your present understanding of the Wallace patent, what do you understand to be the purpose of the tank C?

A. It is, in my opinion, only a let-off for the surplus gas at times and for the purpose of collecting evaporated alcohol and other condensable and soluble substances.

169 R. D. Q. 14. Does it also serve to exclude the air from the tanks while the surplus gas is being let off?

A. It does.

R. D. Q. 15. To perform all the functions which you have enumerated, how far is it necessary that the pipes G should go down into the water?

A. It need not go down any deeper than a few inches below the surface of the water.

R. D. Q. 16. Is pressure an object sought with the tank C in the Wallace patent?

A. No; it is not.

R. D. Q. 17. How does the function and operation of the tank C, as shown and described in the Wallace patent, compare with those of the devices long known in chemistry and the arts for condensing vapors and excluding air from the generating vessel by means of water?

A. They are essentially the same.

R. D. Q. 18. How long, if you know, have such devices been in use?

A. They have been in use since the earliest times in chemistry.

R. D. Q. 19. Then, is the tank C in the Wallace patent a water column in the sense that term is used in the Meller and Hofmann patent?

Objected to as irrelevant and incompetent and leading in form.

A. It is not, more or less.

R. D. Q. 20. What do you mean when you say it is not "more or less?"

A. I have to correct the answer given before, and would state that it is not a water column in the sense of Meller and Hofmann's patent, as it does not work automatically, but depends on the handling of the two-way cocks.

R. D. Q. 21. Has the water column in the Meller and Hofmann patent any other function than to act as a counteracting weight for withholding the gas?

A. It has not.

R. D. Q. 22. Has it not long been quite common in chemistry, applied and otherwise, to use counteracting hydrostatic pressure for the same purpose?

A. It has.

R. D. Q. 23. How long, to your knowledge, has such been the case?

A. Since a great length of time. I cannot remember how long.

R. D. Q. 24. Has it been more than twenty years?

A. Oh, certainly it has.

R. D. Q. 25. From your acquaintance with chemistry and chemical works, should you say that it had been done for more than a hundred years?

A. Yes, sir.

By Mr. COTZHAUSEN:

R. D. Q. 26. When you speak of the pressure exerted by a liquid or spring, do you not understand the pressure to relate to the square inch?

A. Yes, sir.

R. D. Q. 27. And that applies to hydrostatic pressure as to any other known mechanical pressure?

A. Yes, sir.

R. D. Q. 28. Tell us how much pressure to the square inch is exerted by a water column of given dimensions.

A. To about thirty-two feet of water; about fifteen pounds to the square inch. There is a slight fraction, but it is not material.

170 R. D. Q. 29. I see from the commissioner's notes as reduced to writing last night that some confusion or discrepancy has crept into the record in response to hypothetical questions at the opening of the cross-examination; and I now desire to know whether the pressure of liquids to the square inch is not always depending upon the height of the column containing the liquid.

A. Certainly it is.

R. D. Q. 30. And when speaking of pressure we do not generally understand anything different, do we?

A. We do not.

R. D. Q. 31. Now, as you say, the water column in the Meller and Hofmann patent is old, as well as the use of such a column as a counteracting pressure to gases. If that be so, in what does the essence of Meller and Hofmann's invention consist?

Objected to as incompetent.

A. It consists in the early application and use, as fully stated in

my former answers, in assisting the acceleration of the clarification of the beer.

R. D. Q. 32. By what means.

A. By means of the equal and even pressure effectuated by the water column.

By Mr. JACOBS: The counsel for defendants desires to have it stated upon the record that the last words in the answer, "water column," were suggested by Mr. Cotzhausen, and not by the witness.

By Mr. DYRENFORTH: The counsel for complainant desires the examiner to state that the witness closed his last answer with the words "the same;" that Mr. Cotzhausen, in a semi-interrogatory manner, said "the water column," and that these words were then repeated by the witness.

R. D. Q. 33. Are you of German birth, Mr. Rushhaupt?

A. Yes, sir.

R. D. Q. 34. Are you thoroughly acquainted with the English language, and in particular with expressing your opinions on scientific subjects and others?

A. I would not say that I am thoroughly acquainted with the English language, although I believe I am able to express my opinions, but may make mistakes in doing so.

R. D. Q. 35. Now, last night you were asked whether there was any difference in the resisting power of two columns of water—the one a foot high and a foot square, the other a foot high and two feet square—and your answer, as recorded, conveys the idea that the resistance of the latter column was double that of the former. Have you any correction to offer?

A. I have. I meant to say that the absolute weight will be different, but not the resistance or pressure. The latter will be the same in both.

R. D. Q. 36. The weight of the latter would be fourfold, while the pressure to the square inch would be alike, the height being alike, would it not?

A. That is correct.

R. D. Q. 37. In response to cross-question 77 I find it recorded that you used the words "in the last stage of fermentation" when speaking of Meller and Hofmann's patent. What do you mean by the same, or is that a mistake of the writer?

A. I mean to say during the kraeusen stage. If I have said anything else it may be a mistake of mine, which I herewith correct.

171 R. D. Q. 38. When you say, in response to the 56th cross-question, that a pressure of seven pounds would not be advisable for beer in all of its stages, what are we to understand thereby?

A. Said pressure is only advisable in the last stages of fermentation, while in the earlier stages no pressure is necessary whatever.

Recross-examination by Mr. JACOBS:

R. X Q. 1. Between question 10 and your answer thereto there was an interruption of four hours, was there not?

A. Yes; there was.

R. X Q. 2. During that time have you not talked with Mr. Cotzhausen and Mr. Zweitusch about the operation of the Wallace apparatus and learned their views on the subject?

A. I have not talked with Mr. Cotzhausen, but conversed a few moments with Mr. Zweitusch generally in relation to the Wallace patent.

R. X Q. 3. Did notMr. Cotzhausen two or three times explain the Wallace patent to you, or parts thereof, while you were undergoing examination?

A. He did not.

R. X Q. 4. Have you not, during your direct and re-examination, repeatedly adopted suggestions of Mr. Cotzhausen as your answers, in whole or in part, to his questions?

A. I have adopted several remarks, but they were very immaterial to my expressions or else I would not have adopted them.

R. X Q. 5. How many apertures has the Wallace two-way cocks?

A. Two, according to the definition and description.

R. X Q. 6. That is, it has two discharge mouths besides the receiving mouth, has it not?

A. Yes.

R. X Q. 7. So that the Wallace cock could be readily set so that one mouth would form a connection with the down pipe G, and the other at the same time form a connection with the pipe leading into the other tank?

A. Apparently it could.

R. X Q. 8. Insuch case gas coming from a fermenting cask through the pipe to which that cock was attached could pass readily out at either mouth if there was nothing to hinder its passage, could it not?

A. It could.

R. X Q. 9. And in that case the gas going into the down pipe G would stop at the water in the vat so long as it could pass more readily with a less pressure through the other mouth of the cock into the other vat, would it not?

A. It would, certainly.

R. X Q. 10. And when the pressure from the other fermenting vat forced the gas back it would then overcome the pressure of the water and escape through it in bubbles, would it not?

A. It would.

R. X Q. 11. The water then serves to regulate the pressure and to exclude the air from the fermenting liquor, would it not?

A. It would regulate the pressure accordingly and exclude the air.

R. X Q. 12. And when the two-way cock is thus set by the brewer or distiller the apparatus works automatically?

172 A. It does, accordingly.

FREDERICK M. RUSCHHAUPT.

WILLIAM J. SEIB, a witness produced, sworn, and examined on the part of the complainant, deposes and testifies, in answer to questions by Mr. COTZHAUSEN, as follows:

My name is W. J. Seib. I am forty-five years old. I am by occupation a brewer. I am now foreman at Conrad Seipp's brewery in Chicago. The brewery is the largest in this city, and is upward of one hundred and sixty thousand barrels. I have followed the business ever since I was a boy of fourteen, excepting a short time when I was in the army during the late war.

I became acquainted with the Meller and Hofmann process in 1877 and 1878. I cannot tell exactly when. It was at Bartholomae & Leicht's brewery, in Chicago. I have become familiar with the process since this time in all its details, so far as my knowledge extends. We have introduced it into Seipp's brewery, and are constantly applying it. The invention was already introduced when I went there. I like it very well.

Q. 1. How do you now treat your beer while in the shavings cask?

A. I put in my kraeusen material and fining; generally put them in at the same time, then bung it by means of the automatic apparatus of Meller and Hofmann's. I sometimes delay bunging for a short while—a day or two—and in that condition I leave the beer until it's fine—about fourteen days. It depends upon the character and age of the beer which you deal with. I have at times drawn off the same in from six to eight days. You cannot fix an exact time.

Q. 2. How high is the water column, on the average, by which you exert the pressure?

A. The column itself, as we use it, is about fourteen feet high; but on the average we use about twelve feet of water in height.

Q. 3. Do you always make use in your brewery of the connection between the casks which Meller and Hofmann suggest?

A. Yes, sir; we do.

Q. 4. Do you consider that a material advantage in the art of brewing?

A. Decidedly we do.

Q. 5. Do you use an apparatus with an artificial gas-generator or not?

A. We do not need it with shavings casks and kraeusen beer.

Q. 6. Do you use the Meller and Hofmann apparatus and process all through your brewery, on the shavings casks, or only on some of them?

A. We use it all through our brewery on shavings casks, except in a new cellar of a fermenting room, which we applied for that purpose of late.

Q. 7. What is there particularly new or novel in the Meller and Hofmann method of treating beer over the old mode of treatment?

A. The main thing is that you put in the kraeusen and finings and the bung immediately.

Q. 8. How was the beer treated while in shavings casks before the Meller and Hofmann invention became known?

A. We put in the kraeusen and then let the beer work out from the bung-hole. Every second day we had to fill up the casks—sometimes every three days; I did it every two days. In this way
173 we treated the beer until it did not any longer work and was comparatively fine (clear); then we put in the finings. Then, after three or four days more, the beer proved to be bright or brilliant, and then the beer was bunged to charge it with carbonic acid, and then it was racked off into the tapping kegs.

Q. 9. Had you ever known or heard of beer in the kraeusen stage in shavings casks being bunged before the active fermentation was over and the beer clear until this method was suggested by Meller and Hofmann?

A. No, sir.

Q. 10. What, in the main, do you accomplish over the old mode of treatment by this Meller and Hofmann process?

A. First, I save on a thirty-barrel cask about a barrel and a half of beer; secondly, my beer will not become overbunged; third, in the old mode of treating beer, when the liquid was two to three weeks on shavings, it became a shavings taste, which is not the case under the Meller and Hofmann method. You may keep the beer two months in the latter way. Fourth, it also involves material financial advantages, in this: If the beer is not used at the particular time, it needs not, as of old, be pumped over into other casks to guard against the results of overbunging. There is another most important advantage arising from this early process of bunging. It prevents overflowage and the yeast souring the floors and cellars, and, as the yeast is a plant and continues to grow, the atmosphere becomes corrupted, which reacts on the beer in the cellar.

Q. 11. What advantages, if any, do you obtain by connecting the casks in the manner spoken of?

A. The casks are not in even fermentation when separate. One may be slow and the other advanced. In one the fermentation may have spent its force and be departing. By connecting the casks with each other the carbonic acid gas is equalized in all of them, and the beer will become more even.

Q. 12. So you consider, then, the Meller and Hofmann process a very valuable invention in brewing, do you not?

A. I consider it a very good improvement, and should not want to work without it.

Cross-examination by Mr. JACOBS:

X Q. 1. The Meller and Hofmann apparatus is valuable because it is self-regulating, is it not?

A. The apparatus is not valuable because it regulates itself, but because of its results. I cannot understand the drift of the question.

X Q. 2. Would it accomplish these results if it were not self-regulating.

A. No, it would not accomplish the results spoken of if it were not self-regulating.

X Q. 3. Have you ever used any other self-regulating apparatus except Meller and Hofmann's?

A. No.

X Q. 4. And you don't know anything about any other self-regulating apparatuses, do you?

A. I have not worked with any, but I have seen the Zweitusch automatic bungs.

X Q. 5. How did they work?

A. I have not worked with any of them and could not tell you.

X Q. 6. How long have shavings casks been used in American breweries?

A. In so far as I remember, it is now for seventeen to eighteen years past.

174 X Q. 7. When did you go into the army?

A. In 1861.

X Q. 8. In what breweries had you worked before you went into the army?

A. I worked in Huck's, Lions; before that in Detroit. Huck used the shavings casks. The others did not.

X Q. 9. Have you ever heard of Henry Shlaudeman's automatic bunging apparatus?

A. I have never seen it, but have heard of it.

X Q. 10. Have you ever heard of the Hicks automatic bung?

A. Not to my best recollection.

Redirect examination:

R. D. Q. 1. Have you ever heard of bungs being used to prevent the bursting of the casks or to guard against overbunging of the beer?

A. I did not.

R. D. Q. 2. Were not at times vents or safety-valves or air-pumps used while the casks were bunged or the beer drawn off?

A. Yes; I recollect that at Huck's, about 1860, when the bung was put in we did put on an air-spigot on top of the cask, so that the tight bung need not be loosened. I think also about the year 1866 air-pumps came in use for racking off the beer. I did hear of others of a similar nature, and read of them at times in brewing periodicals, but I never used them.

W. J. SEIB.

STATE OF ILLINOIS, } ss:
Cook County, }

I, Charles C. Linthicum, a notary public in and for said county, in the State aforesaid, hereby certify that all the proceedings aforesaid were had as stated in the cause named in the caption hereto; that I was attended by the counsel named in said caption at the time and place therein stated, and by the witnesses, Frederick M. Ruschhaupt and William J. Seib, who were of sound mind and lawful age; that said witnesses were first duly sworn to testify the truth, the whole truth, and nothing but the truth in said cause; that their depositions were reduced to writing in their presence and from

their statements, and that they each subscribed the same in my presence as and for their depositions in said cause.

I further certify that I am not solicitor or of counsel for either of the parties in said cause, nor in any way interested in the event of said cause, and that the witnesses reside more than one hundred miles from the place where said cause is pending.

In witness whereof I have hereunto set my hand and notarial seal this 14th day of November, A. D. 1882.

[NOTARIAL SEAL.] CHARLES C. LINTHICUM,
Notary Public.

175 Testimony taken in behalf of the complainant, before Charles T. Brown, notary public, at the office of Messrs. Banning & Banning, Chicago, October 11, 1882, pursuant to notice and by consent of parties.

Present: F. W. Cotzhausen and P. C. Dyrenforth, of counsel for complainant, and C. P. Jacobs, of counsel for defendant.

WALTER S. HAINES, being first duly sworn, testified as follows in answer to questions by Mr. COTZHAUSEN:

Q. 1. What is your name, age, residence, and occupation?

A. Walter S. Haines; 32 years; professor of chemistry in Rush Medical College, in Chicago.

Q. 2. Will you please inform the court as to what studies you pursued leading towards your present position, and how your time has been engaged and occupied of late years?

A. I have been engaged in the study, teaching, and practice of chemistry about sixteen years. I have been the professor of chemistry in Rush Medical College during the last six years. Before accepting this appointment I had been the professor of chemistry in the medical department of the Northwestern University, of Chicago, for four years.

Q. 3. Has the pursuit of your studies extended to the European continent?

A. I have spent nearly a year and a half in Europe, continuing my studies, spending most of my time in the pursuit and study of chemistry.

Q. 4. What is the standing of the college at which you are now engaged?

A. Rush Medical College, with which I am now engaged, is recognized as one of the leading institutions of the kind in America, ranking second in size, attendance, etc.

Q. 5. Have you had occasion to testify heretofore in cases involving questions of chemical science?

A. I have had occasion to testify a number of times in such cases. I am frequently called upon to examine the chemical properties of substances, and make such investigations my profession.

Q. 6. Have you at any time testified as an expert relating to the subject-matter of the present litigation?

A. I have testified once or twice before in relation to this patent of Meller and Hofmann and matters connected with it.

Q. 7. Have you familiarized yourself with the chemical side of the brewing process as practiced in this country?

A. I believe I have familiarized myself with the chemistry of beer-brewing as practiced in this country, partly by observation in various breweries, partly by reading books upon the subject, partly by experiments conducted in my laboratory.

Q. 8. Has your observation and study extended to what might be called the theory of fermentation?

A. The whole subject of fermentation, both theoretical and practical, is one of the greatest importance in chemistry, and I have, therefore, given much time to its study and observation.

Q. 9. What are the main stages of fermentation in the process of making beer? Are they distinguished by any particular terms or names; if so, what?

A. The sweet wort mixed with the yeast undergoes a rapid fermentation in open vats, which is frequently called the chief
176 or main fermentation. After this has subsided the beer is drawn off into storage or ruh casks, closed or nearly closed, in which a slow fermentation continues, which is sometimes called the after fermentation. From these casks the beer is drawn into what are known as shavings casks, freshly fermented beer is added, and a lively fermentation is thus set up. This stage is frequently called the kraeusen stage in shavings casks.

Q. 10. Can you shortly explain to us how the beer in the storage or ruh casks was treated prior to the introduction of shavings casks proper in the course of the after fermentation to which you allude?

A. In the ruh casks the beer was allowed to remain at a low temperature for a number of weeks or months, during which time a very slow fermentation took place and various chemical changes were produced in the beer. Most of the yeast was deposited, and the beer itself, while it became more highly alcoholic, gradually grew flat through the escape from it of the carbonic acid gas. Before drawing off the beer for use, in order that it might be charged with an excess of carbonic acid gas to give it life and a pleasant taste, it was the custom to bung a cask up, by which any further generated carbonic acid gas was dissolved in the beer, giving it the desired effervescing qualities.

Q. 11. When drawn off into ruh casks was there any material difference in treating lager or young beer? If so, will you shortly allude to it?

A. In the treatment of lager beer in the ruh casks the fermented wort was added, usually in portions, a little at a time, so that at no time was there a very rapid fermentation in these ruh casks; but in the treatment of young beer it was added or was placed in the ruh casks all at once, and the fermentation which took place was much more lively.

Q. 12. How did such more lively fermentation with young beer manifest itself?

A. There was a considerable development of carbonic acid gas, much foam was often produced, and not infrequently there would be, therefore, some overflowing of the cask.

Q. 13. The casks were generally kept rather full so that such overflowage during the first time should take place, were they not?

A. This was frequently done in order that the beer might clarify itself—somewhat at least—by this overflowage.

Q. 14. Leaving out of mind now entirely the treatment of lager beer, which I understand has been discarded almost altogether in this country, and confining our attention to the treatment of young beer, prior to the introduction of shavings casks proper and the addition of kraeusen, what were the leading objects sought to be obtained in treating the beer as you stated?

A. There were two objects largely in view—one, the development, by slow fermentation, of alcohol, various ethers, and other odorous principals; and, second, the clarification of the beer by a process of overflowage that as been previously referred to, and of settling. The overflowage naturally would precede the clarification of the beer by settling, for as long as carbonic acid gas was being given off, producing overflowage, it would be difficult for the impurities to settle to the bottom of the cask, being kept stirred up by the giving off of the gas.

Q. 15. What was the object of bunging to which you refer?

A. The object of bunging the casks was to cause the retention in the beer of the carbonic acid gas, which was still being slowly
177 given off, and thus give life and effervescing qualities to the beverage.

Q. 16. At what time, during the treatment in storage casks, was such bunging resorted to?

A. Toward the very close of the storage, after the sediment had subsided.

Q. 17. What kind of bungs were originally used for such purpose?

A. A tight bung was first used.

Q. 18. Were there any inconveniences, drawbacks, or dangers that manifested themselves to the brewer while so treating the beer and using the tight bung? If so, shortly explain them.

A. There were inconveniences attending its use. If too much gas was generated within the casks the latter might burst from overpressure. Again, in drawing off the beer from casks thus bunged, a violent escape of gas was liable to ensue, which would cause an uprising of the sediment from the bottom of the cask, and in that way render the beer turbid.

Q. 19. What improvements in the former mode of tight bunging were made, if you know, to remedy these various defects and drawbacks?

A. To remedy these defects efforts were made, I believe, to substitute for the tight bung various devices which would allow any excess of gas to escape in case the integrity of the barrel was threatened. Bungs with elastic bands, or charged with weights, were suggested to accomplish this object. So, in order to prevent the stirring up of the sediment from the bottom of the casks when the beer was being drawn off, it was proposed to force air into the casks, in this way keeping up the pressure and thereby preventing a too violent escape of the carbonic acid.

Q. 20. By what means, Professor, was air forced into the casks?

A. Usually by means of air-pumps.

Q. 21. How applied or used?

A. It could be applied and used either in connection with the bung, or separately, according to the will of the brewer.

Q. 22. I understand that within the last fifteen years, especially on the American continent, the use of shavings casks has been rather generally resorted to. Will you please to explain in what manner and for what purpose—what the leading object was—in so using shavings casks instead of continuing the treatment of beer in ruh casks, as of old?

A. In order to reduce the time of the preparation of beer for the market the use of shavings casks have been resorted to. The beer is placed in casks containing shavings, and therefore called shavings casks, and a quantity of fresh beer, technically called "kraeusen beer," in an active state of fermentation is added. This sets up a new and brisk fermentation in the beer; so active, indeed, is the action that it overflows the barrel at the bung-hole and new beer has to be added from time to time to take the place of what has overflowed. After a time, however, the violence of the fermentation abates, and the beer no longer overflows. Finings now being added, allowed to rest, the sediment subsides, partly from its own gravity and partially from the agencies of the finings added, but the subsidence will be slow. When, after the lapse of considerable time, the beer has become clarified, if it is desired for market, it is bunged and kept until charged with carbonic acid gas.

178 Q. 23. Has this method of treating beer in shavings casks somewhat hastened the production of marketable beer as compared with the old method?

Objected to as leading—for form.

A. This method of treating beer in shavings casks somewhat hastens the production of a marketable article over the old method.

Q. 24. Am I correct in understanding by your previous answer that the general treatment of the beer remains substantially the same, with the exception of adding, while in the shavings casks, fresh kraeusen beer to hasten the clarification?

A. In my opinion, you are.

Q. 25. Now, do you know of any material progress or change in the treatment of beer subsequent to the addition of kraeusen beer or the use of valves, air-pumps, and other mechanical devices of the character by you alluded to; if so, what were such changes, and to what time do they date back?

A. I know of no important changes or improvements in addition to those I alluded to until the time of the introduction of the Meller and Hofmann process, which, I believe, was patented about the year 1876, in France.

Q. 26. Have you had occasion closely to examine the Meller and Hofmann patent, United States, No. 215,679?

A. I have examined and studied this patent a number of times.

Q. 27. Are you familiar therewith?

A. I believe I am familiar with it and understand it.

Q. 28. Now, aside from the mechanical means or apparatus recommended and employed by Meller and Hofmann—leaving the mechanical part of the patent out of consideration for the present—will you please inform us whether such patent introduced or engrafted upon the brewing art any novel feature or process in the treatment of beer while in a state of active fermentation in ruh casks or the kraeusen fermentation in the shavings casks; if so, will you please point out its material features?

A. The Meller and Hoffman patent contemplates the application to the beer, either in the ruh or shavings casks, of an apparatus which shall automatically regulate the pressure in the casks. This apparatus may be applied either when the fermentation has first set in or after the fermentation has proceeded, more or less. The application of pressure and the exclusion of air from the casks at this time produces very many excellent effects which had not been obtained, so far as I know, by any appliance or process used up to the date of this patent. It causes, in the first place, the sediment in the beer more rapidly to subside, and consequently does not necessitate the use of so large an amount of fining material. It preserves the beer from an excess of fermentation, and so improves its qualities. It prevents, if applied in season, the overflowing of the casks and the consequent loss of beer; also the fouling of the cellars by the fermentation on the outside of the casks or on the floor. It also keeps the beer under pressure, and consequently charged with carbonic acid gas. The latter object was accomplished by some automatic bungs used before the time of this patent, but the many other advantages were not secured by their use, and it is these other advantages mentioned which I regard as the most important in the preparation of good beer.

Q. 29. Now, aside from this new process of placing the beer under an automatically regulated pressure during the kraeusen or
179 active fermentation, when it first sets in or after it has proceeded somewhat, does not the patent also embrace a process of treating the beer in connected casks; if so, will you please shortly explain it?

Objected to as incompetent and irrelevant and not within the province of a scientific expert to determine. It is for the court to determine that which it contemplates and its scope.

A. In my opinion, the patent contemplates the treatment of beer as previously described, either in a single cask or in connected casks.

Q. 30. Does it not also cover means or apparatus which are said to be well calculated and adapted to accomplish the various ends in view?

Objected to for the same reasons above given.

A. In my opinion, such is the case.

Q. 31. Will you please tell us wherein the novelty or advantages

of the first process to which you allude consists, and what is sought to be accomplished?

Objected to as incompetent. The patent itself and the specifications must determine.

A. The Meller and Hoffman system accomplishes, in my opinion, many results which had not before been obtained, and it acts, in doing so, in this way: Automatically regulated pressure is applied to the casks during the process of active fermentation, and air is thereby, of course, excluded. Under this increased pressure and the exclusion of air, fermentation takes place more regularly, and the impurities in the beer settle more rapidly. By the exclusion of the air, moreover, fewer impurities are produced, for it is a demonstrated fact that when oxygen is excluded from a fermenting mixture, fewer yeast cells and other solids are generated. Not only is there, therefore, produced less matter to subside, but by the increased pressure these particles are rendered specifically heavier, and therefore settle much more rapidly. The process, therefore, if applied during the stage of active fermentation, not only regulates the fermentation, but will materially hasten the clarifying of the beer, both of which are objects not obtained, so far as I know, by any previously used process or apparatus.

Q. 32. At what time, as you understand the patent, is this process of automatic pressure or bunging to be applied?

A. It is applied either to the ruh casks during the second active fermentation or to the shavings casks during the kraeusen fermentation.

Q. 33. I find the term kraeusen stage repeatedly used in the patent. What may we understand by such term? Please explain.

A. I understand the "kraeusen stage," as used in the patent, applies to that period of the fermentation of the beer in shavings casks after the addition of the young or kraeusen beer and until this second active fermentation has ceased.

Q. 34. The fermentation of beer, in rational brewing, is expected to continue more or less to the very time of actual use, is it not?

A. The beer continues to ferment slowly to the very time it is used, but active fermentation subsides with the close of the kraeusen stage.

180 Q. 35. If I understand you correctly, the visible marks of fermentation—visible to the naked eye—more or less subside, and the beverage afterwards merely undergoes a hardly perceptible after fermentation; is that correct?

A. Towards the close of the kraeusen fermentation the marks of active fermentation cease, and the fermentation which succeeds is comparatively so slight as to be almost imperceptible to the unaided senses.

Q. 36. Can you tell us, Professor, from the patent, whether the addition of kraeusen material and finings must be made at the same time, or whether the old practice to which you have alluded may be continued under this patent process?

Objected to as incompetent and irrelevant.

A. I do not understand that under this process the kraeusen and finings must necessarily be added at the same time, but, as in the old system, the kraeusen may be put into the casks and the finings added afterwards.

Q. 37. Please give us some idea as to the course of fermentation in shavings casks, the beer being in a normal condition and kraeusen being added; how it begins and how it gradually resolves itself in the various stages, without regard to the process here in question.

A. The beer when put in the shavings casks admixed with kraeusen begins, in the course of from twelve to thirty-six hours, to show new signs of fermentation. This increases in intensity, and before long the foam rises to such an extent in the casks as to overflow through the bung-hole; this overflow now lasts a few days and then begins to subside, the fermentation becoming slower and slower. After a time the activity of the fermentation has become so greatly reduced that carbonic acid gas is developed very slowly. Now, the particles mechanically suspended in the beer, especially if finings have been added, begin to subside, and at the end of from twelve to twenty days, or even more, the fermentation, clarifying, and settling may be said to have been accomplished. The time required in all of the above processes varies considerably, according to the temperature, quality of the yeast, and character of beer employed.

Q. 38. Now, will you please to contrast in what manner the clarification of the beer and its preparation for the market was accomplished by the trade before, and, again, in what particular manner this patent of Meller and Hofmann's deals with the subject?

The last part of the question is objected to on the ground that the patent itself must determine that question, and it is not competent for the witness to speak.

A. Under the old system the beer was clarified, first, by overflowage—that is, a portion of the yeast cells and other sediment was, by the upward pressure of carbonic acid gas in the casks, driven out of the barrel through the bung-hole; second, as the fermentation began to subside and a great excess of the carbonic acid gas was no longer given off, the impurities had a chance to settle to the bottom of the cask among the shavings by reason of their gravity. This, however, was a slow process, owing to the fact that these particles are not very heavy; moreover, the upward rising bubbles of carbonic acid, even though not great in number, would have a tendency to disturb the purity of the beer. Third, finings were added at the close of the active fermentation, which mechanically would entangle the solid particles of the beer, and then by gravity cause them to settle. The same disadvantage, however, applied here as in the second case, for the carbonic acid gas bubbles would have a
181 tendency to buoy it up, and hence keep it from promptly settling. Such was chiefly the old method of clarifying beer.

The Meller and Hofmann system, however, revolutionizes this matter, for, by excluding air from the casks, it, in the first place, prevents an undue formation of yeast cells and other solids, and so

diminishes the amount of impurities present. It has been demonstrated that fermentation which takes place away from contact with the oxygen of the air is prone to generate fewer yeast cells, and so contaminate the liquid less with them than the fermentation which goes on in contact with the air. This is an important advantage gained by the Meller and Hofmann system. In the second place, not only does this new system prevent the formation of sediment, but it also hastens the subsidence of the impurities present. It acts, in accomplishing this, in this way: Pressure being exerted upon the liquid, so much carbonic acid gas does not at first arise, but is held in solution in the beer until the pressure is equalized; consequently there is not at first so much mechanical agitation of the beer by the evolution of gas. But a more important action now sets in: The increased pressure causes the particles of yeast and other impurities to become denser and of a higher specific gravity, and so forces them more rapidly to subside. The Meller and Hofmann process, therefore, not only produces less sediment, but, by increasing its density, obliges it to settle more rapidly. There is, indeed, still another advantage more or less connected with the clarification of the beer when that process is used. It is found that under pressure the yeast cells do not occasion so rapid a fermentation as they do when no pressure is applied. Hence, when using the Meller and Hofmann process, pressure being exerted upon the fermenting fluid, less fermentation goes on; consequently fewer bubbles of carbonic acid gas are generated or arise from the fluid and escape. From this cause there is less disturbance of the fluid by mechanical agitation of the uprising gas, and the particles, therefore, held in suspension have a better chance to deposit.

Q. 39. Under this new process, then, as I understand you, the old mode of clarifying by overflowage from the bung-hole and afterwards by settling or remaining sediment on the bottom is sought to be contracted into one operation.

A. Yes, sir; that is the case.

Q. 40. And, in your opinion, it does not materially matter in principle at what precise stage of the active fermentation the automatic pressure is first applied; did you say so?

A. In principle it does not matter at what stage the automatic pressure is applied, only, if it is put off, some advantages obtained by its early application are lost.

Q. 41. And while it does not affect in principle the process, at what particular time during the active fermentation it is first applied, what do you say as to continuing it?

A. After the pressure is once applied, in order that the advantages of the system may continue, it is necessary that the pressure be maintained; otherwise the escape of gas from the beer, when the pressure is taken off, would again charge the liquid with impurities.

Q. 42. Now, as to the connection between the casks, the gas from one being allowed to enter the other, will you please explain what effect that has, in your opinion, upon the beverage?

A. Several casks being connected, and all, therefore, sub-
182 ject to the same pressure, in my opinion, the fermentation would proceed more equally in all of them. The subsidence of the impurities would be more regular and the beer, therefore, be brought to a finished condition more uniformly.

Q. 43. Would it affect the time or readiness for market?

A. The effervescing character of the beverage in the various casks connected being subjected to the same pressure, it would be in readiness for the market about the same time and have about the same effervescing qualities.

Q. 44. Could not the process first alluded to, "hastening under automatic pressure the clarification of the beer," be produced by any apparatus which at all times works truly automatically and is susceptible of causing the pressure suggested by the inventor?

A. Any form of apparatus that works truly automatically and produces the desired pressure would unquestionably produce the same results as those spoken of in connection with the Meller and Hofmann process.

Q. 45. But what do you say, Professor, of the use of a water column suggested by the patent No. 215,679, to Meller and Hofmann, as distinguished from the vents or safety-valves of which you have spoken heretofore in connection with the bunging?

A. The use of a water column for automatically regulating pressure would act more regularly and more certainly than springs, valves, etc., and therefore would be superior to them.

Q. 46. Would any apparatus causing a pressure merely insignificant in its nature (say one pound, more or less) be apt to secure the advantages covered by this process of Meller and Hofmann?

A. Any apparatus giving a trivial pressure in the casks would not obtain some of the important advantages gained by the Meller and Hofmann apparatus. As I have explained before, the pressure in the casks renders the sediment more dense, and therefore heavier, and consequently causes it to subside more rapidly. Now, if the pressure were trivial, as, for example, one pound to the square inch, the results attained would naturally be very slight, while a pressure of several pounds would produce rapid results, by reason of greater condensation, and therefore greater weight of the impurities in the beer.

Q. 47. Considering that brewers on the average add from fifteen to twenty per cent. of kraeusen material, would not the application of an insignificant pressure—one pound, more or less—in your opinion, be equivalent to leaving the cask for a number of days altogether open?

A. In case of such an insignificant pressure being applied during the kraeusen stage, the amount of carbonic acid gas evolved being very large, practically the valve or other appliance used would unquestionably be open all the time to give vent to the great amount of gas evolved, and consequently but little effect could be occasioned.

Q. 48. Are you prepared to express any opinion whether the process suggested by said patent, aside from the various advantages alluded to (such as preventing overflowing and incidentally loss of

labor, and so forth), has any influence on the beverage itself and the cost of production?

A. I have no doubt brewing can be more cheaply conducted by the new process of Meller and Hofmann than under the old system:

First. There is not the same loss of beer from overflowage.

183 Second. The amount of fining material that is necessary is not great.

Third. Undue fermentation being stopped by the pressure, a better quality of beer is obtained, which, of course, is equal to a cheapening of the article. The cause of this better quality of beer may be explained as follows: During fermentation the sugar, and probably also much of the dextrine and extracted matters of the beer are decomposed. This decomposition is proportionate to the amount of fermentation that takes place. Since now, under the pressure and exclusion of atmospheric air contemplated by — Meller and Hofmann process fermentation is diminished, the excessive disintegration of these valuable constituents of beer will be avoided, and instead of escaping largely in the form of carbonic acid gas they would be left behind in an unchanged condition in the beer, of course improving its quality and value.

Q. 49. You have stated that it matters not, in your opinion, whether the automatic pressure is applied at once after the addition of the kraeusen material or later, while active fermentation continues. Will you please explain whether there is not some difference in principle?

A. If the pressure is applied during the kraeusen stage the principle is the same, whether it be applied at the beginning or after it is well continued. Some of the advantages derived by the early application of the pressure would be lost if applied late; but this is a difference of quantity and not of quality; the kind of advantages obtained would be the same, only not so great in amount. The advantages of the Meller and Hofmann process come from automatically regulated pressure during the second or kraeusen fermentation before the beer is fully clarified. Pressure applied at any time during this stage of the manufacture of beer and continued until completed would gain the advantages, to a greater or less degee, introduced by the Meller and Hofmann process.

The further examination of this witness is here adjourned, by consent of counsel for the respective parties, to Thursday, October 12th, 2 o'clock p. m.

THURSDAY, *October 12th*—2 o'clock p. m.

Direct examination continued by Mr. COTZHAUSEN:

Q. 50. To what time in science or technical art does the use of water columns as a means of resistance date back?

A. The use of a column of water or other fluid dates back very many years. I do not know the exact date when they were introduced, but in my earliest study of chemistry, sixteen years or more ago, I read of them and learned their use.

Q. 51. Have they not generally been used and applied in a variety of forms, both for the purpose of excluding the access of the atmosphere as well as acting as a weight and causing a resistance to escaping gas?

A. They have long been used for both of these purposes, and I have myself very frequently employed them in this way in my own chemical experiments and processes.

Q. 52. Please look at the translation from Dr. Stalchmidt and tell us whether in figure 60 a hydraulic bung or column of water is not used in connection with beer casks.

A. Figure 60 certainly represents an apparatus for creating pressure by means of a water column.

184 Q. 53. Now, I will ask you again, since you have described the effect of the Meller and Hofmann device upon the beverage, and the economy of its manufacture, whether the same effect would not follow the use of any other device by which the beer is held under automatically controllable pressure substantially to the extent claimed by these patentees?

Objected to as leading in form, and as incompetent.

A. Precisely the same effects would be produced by any other device which produced automatically controlled pressure of a sufficient degree, if applied during the second active stage of fermentation; the later it might be applied, the less the effect, but this would be a difference of quantity and not of quality. If, however, pressure were applied after the active fermentation had ceased and clarification had been accomplished, then the effects of the pressure would be quite different. Its sole effects then would be to charge the beer with carbonic acid gas and prevent injury to the casks by an over accumulation of that gas, but it would not at all aid in the clarification of the beer, that process having been already accomplished; if, however, the pressure is applied while the active fermentation is still going on, and therefore before clarification has been accomplished, the pressure, by whatever device produced, if of a sufficient degree of intensity, would accomplish the same result, namely, the rapid clarification of the beer, as I have before explained.

Q. 54. Now, I call your attention to the testimony of Gen. Sturm, on pages 47 to 59; tell us whether the devices there described would be suitable and adapted in the form shown and described, to practice in the Meller and Hofmann process during the stage of active fermentation?

A. In my opinion the forms of apparatus described and figured in the testimony of Gen. Sturm could not be practically applied for the purposes of the Meller and Hofmann process, for the bungs figured and described would certainly become clogged by the foam that is sent upward in considerable quantity during the active fermentation, and, becoming clogged, would either cease to act or else remain permanently open. The other device figured and described contemplates, according to the description, the application of a very trivial pressure, stated by the witness himself as equivalent to about

a pound per square inch. As I before testified, I believe such a trivial pressure would not bring about the effects obtained by the Meller and Hofmann process, although it would be sufficient to charge the beer with a certain amount of gas and prevent the casks from bursting, which, as I understand it, was the object of the apparatus now spoken of.

Q. 55. Can you tell us from the testimony of said witness, and referring to the time of the use of these various devices by him described, for what purpose and at what stage of manufacture they were used?

A. According to the account of the witness, the apparatuses were used to allow the carbonic acid gas to escape and at the same time prevent the atmosphere having access to the beer. It is difficult to determine from the testimony of the witness exactly at what stage of the brewing of the beer the apparatuses were employed; but as he states that they were made in 1860, at which time the treating of beer with kraeusen in shavings casks was not practised, it is evident that the apparatuses were not intended to be applied during this stage of brewing.

185 Q. 56. Does not the witness distinctly recognize their use on lager beer casks?

Objected to as improper and incompetent.

A. The witness states that the beer in the casks to which the apparatuses were applied was intended particularly for lager beer, and was undergoing the second stage of fermentation.

Q. 57. Now, what does the second stage of fermentation with lager beer mean, and at what temperature is that conducted?

A. It means the slow, gradual fermentation which takes place when the beer has been drawn off into large ruh casks and are placed in cool cellars.

Q. 58. Is not that what the brewers of old called the stage of after fermentation?

A. That is the term which I have usually heard applied to this stage, and which I myself would generally use to describe it.

Q. 59. Is not the term second fermentation most generally applied to that second fermentation which is called forth by the addition of kraeusen material in shavings casks, as distinguished from what is known as after fermentation?

A. I understand that the term second fementation is applied to the rapid fermentation of the beer after the addition of kraeusen, when in shavings casks, and does not refer to the after fermentation in ruh casks.

Q. 60. Under what circumstances might it happen that in manufacturing or treating lager beer in the after fermentation the valves or vents can come in contact with rising foam, it being generally conceded that lager casks are filled up but gradually?

A. The foam would come in contact with the valves when the lager casks had become nearly filled to the top.

Q. 61. That is to say, during the very last filling of the casks,

and before or just preliminary to the bunging for the purpose of confining the last particles of carbonic acid gas. Am I correct?

Objected to as leading and incompetent.

A. Such is my understanding of the matter.

Q. 62. Would not at that time the lager beer be substantially clarified and clear?

Objected to as leading and incompetent.

A. My opinion is that it would be.

Q. 63. Now, when you say that the use of a water column, or a column of other liquids as a means of pressure or confining gases, is old; that the use of kraeusen material and finings for the purpose of clarifying is comparatively old, and that bunging, using tight bungs or automatically working relief bungs and air-pumps, are old, what is there, then, novel or characteristic in the Meller and Hofmann patent entitling it to the consideration that you claim for the same?

A. The novelty and characteristic feature of the process, by which its excellent results are produced, chiefly arises from its introducing an automatically acting process at an earlier stage of the preparation of beer than has been practiced by other devices. This earlier bunging produces a number of valuable results, one of the most valuable of which is the rapid clarification of the beer. By placing the actively fermenting liquid under adequate, automatically controlled pressure, and keeping it thus under pressure until drawn off for use, the beer ferments more equably, less sediment is pro-
186 duced, and clarification is more rapid and more certain. It is then, as I understand it, not the mechanical application of pressure, but the application of a suitable pressure, beginning with the second active fermentation of the beer and continuing to the close, that constitutes the most valuable and novel feature of this process.

Objected to as mere repetition of what the witness has previously said.

Q. 64. When you say beginning with the second active fermentation let me call your attention to previous testimony given by you where you stated that it was not, in your opinion, essential that the pressure should be applied from the first. Now, will you please tell us whether you meant to lay stress upon the words first quoted from your last answer?

Objected to as leading in form.

A. I did not wish to be understood, and I did not intend to say, that this automatically regulated pressure must be applied at the beginning of the second active fermentation, but it begins with the second active fermentation—that is, at any time during this fermentation.

Q. 65. Applying a mechanical device producing but trifling or insignificant pressure, say one pound, more or less, to beer in shav-

ing casks, intermixed with kraeusen, as commonly practiced, say fifteen to twenty per cent., what would be the effect of the fermentation thereby produced upon the mechanical device referred to?

A. The amount of carbonic acid gas produced in such fermentation being very considerable, if the pressure were no more than a pound, the valve of the automatically acting bung or other device would be kept open almost if not quite constantly. The perfect exclusion of air, therefore, would not be possible, and the effect upon the beer would be small.

Q. 66. Would not the device in question virtually, and for a number of days entirely, lose its automatic pressure and effect upon the beverage, and leave the cask substantially as if entirely open?

A. I cannot quite say that; the pressure being slight and the valve open much of the time, the effects produced, as I have said before, I think would not be great.

Q. 67. Would it produce the results upon the clarification and speedy readiness of the beer for market, substantially as under the Meller and Hoffman patent?

Objected to as leading in form.

A. It certainly would not act nearly as rapidly nor as efficiently as the Meller and Hofmann process.

Q. 68. Have you had occasion to examine the patent of G. Wallace, No. 62581, and compared the same with the patent of Meller and Hofmann? If so, will you please, shortly, *to* define the characteristic points of similarity or difference, if any——

Objected to on the ground, first, that the witness has not shown that he has the requisite knowledge to compare the patents referred to; second, if the apparatus are meant, he has not shown that he has the sufficient mechanical knowledge to testify as an expert upon the mechanical differences between these devices.

Q. 69. (continuing) both as to apparatus and results thereby produced?

A. I have examined the Wallace patent, and compared it
187 with the process and apparatus of Meller and Hofmann. In my opinion, the two are radically different. The Wallace patent introduces to the bottom of one fermenting tank a pipe which is connected with the upper portion of the other fermenting cask. Now, if any excess of pressure should occur in either cask over what there is in the other, a quantity of carbonic acid gas will be forced to the very bottom of the cask having the smaller pressure, and in this way the yeast and other sediment will be thoroughly stirred up and diffused through the fermenting liquid. This would unquestionably increase the rapidity of fermentation, but it would accomplish exactly the opposite result of what the Meller and Hofmann process contemplates—namely, the forcing down of the sediment so as to clarify the beer and not its agitation and dissemination through the fluid. It seems to me, therefore, that the Wallace apparatus and process, as figured and described in patent 62581, would not and

could not be used for the same purposes that the Meller and Hofmann process is employed.

Which were all the questions propounded on the direct examination of this witness; whereupon the witness was cross-examined by Mr. JACOBS, and testified as follows:

X Q. 1. Have you ever seen the circular issued by the New Process Fermentation Company, in which, among the officers of the company, under the head of experts and scientific advisers, appears the name of Walter S. Haines, professor of chemistry and toxicology?

A. I believe I have seen the circular which you refer to.

X Q. 2. You are the person therein named?

A. I am.

X Q. 3. Have you not been otherwise publicly advertised in newspapers as a professional expert and scientific adviser of that company?

A. Not that I am aware of. I do not remember ever to have seen my name in public print in connection with this process, with the single exception of having once seen the circular you refer to.

X Q. 4. When were you first retained by this company as its expert and scientific adviser?

A. I do not know that I ever have been retained as a scientific expert or adviser other than this: That about three years ago I was asked by Mr. Bartholomae to investigate his process, and since then have been called upon by the company, which has since been formed, as an expert witness in some of their cases.

X Q. 5. Have you not been regularly called upon and employed as an expert witness in all of their cases arising out of the litigation of this patent?

A. I cannot say, as I am not acquainted with all of their cases?

X Q. 6. Have you a regular salary, or are you employed and paid for what time you use?

A. I do not receive a salary from the company, but receive payment simply for the time I use as an expert witness, or in making experiments for them.

X Q. 7. The Bartholomae you speak of is George Bartholomae, the president of the company, is it not?

A. I believe that is his name.

X Q. 8. Did you know that he had applied for a patent—an apparatus like the Meller and Hofmann, in 1878?

A. I know nothing whatsoever about his application for patents.

X Q. 9. Did you ever see that patent?

A. I do not now remember ever to have seen it.

X Q. 10. Were you ever called upon as an expert to examine it?

188 A. I think not.

X Q. 11. Do you know that it was a patent merely for an apparatus and not for a process at all?

A. As I have before stated, I do not think I have ever seen the patent, and consequently I cannot make any statement about it.

X Q. 12. Have you ever seen any foreign patents which are claimed to be owned by this company issued in France and Belgium?

A. I think the only patent which I have seen in connection with the Meller and Hofmann process is their American patent.

X Q. 13. The one on which this suit is brought?

A. I believe it is.

X Q. 14. You have no practical knowledge of beer-brewing, I believe?

A. That depends upon what is meant by the term practical knowledge.

X Q. 15. Well, you have never had any experience in the actual brewing of beer in breweries, have you?

A. I have never been an actual brewer of beer in a brewery, but I have visited several breweries to investigate the process, and have made many experiments in my laboratory in connection with the subject.

X Q. 16. Do you call that a practical knowledge of beer-brewing?

A. I regard it as a mixture of practical and scientific knowledge.

X Q. 17. It is purely empirical, isn't it?

A. It is not at all empirical; it is wholly scientific.

X Q. 18. Did you or did you not say that you had studied works on beer-brewing?

A. I have studied the subject of beer-brewing from various works.

X Q. 10. How much time have you ever given to that specific subject?

A. It would be impossible to make a calculation. I have read on the subject ever since I began the study of chemistry, it being one in which my earlier years of chemical investigation interested me greatly, and I therefore took occasion to read about it.

X Q. 20. Well, as distinguished from mere general works like chemistry, have you ever read any practical work upon beer-brewing intended for the use of the practical brewer?

A. I have never read entirely any book designed expressly for the practical brewer.

X Q. 21. Do I understand you to call the kraeusen stage in beer that where the beer has been drawn off from the ruh casks into the shavings casks and new beer added?

A. As I understand it, such is the usual acceptation of the term at the present time.

X Q. 22. Was it always so?

A. I believe in former years, before the present system of brewing was introduced, the term kraeusen was applied to the rapidly fermenting sweet wort from the curly appearance which the foam had as it arose from the fermenting liquid.

X Q. 23. Do you or do you not know that brewers now throughout the country call the one stage of fermentation, and also the other, indifferently, by the term of kraeusen?

189 A. I can only state this, that in my intercourse with brewers, whenever they have used the kraeusen stage, they have referred to the second active fermentation in the shavings casks.

X Q. 24. There are only two stages of active fermentation, are there?

A. That is all.

X Q. 25. And the intermediate stage of the beer when it is in cellars in what are called the ruh casks, the beer ferments very slowly, does it not; and almost imperceptibly, does it not?

A. Usually such is the case.

X Q. 26. And when the beer is in these rush casks and in cool cellars where the temperature is below forty degrees, does the foam rise and flow freely from the bung-hole of these casks if they are open?

A. It does not in the case of lager beer, but in the case of young beer it does overflow sometimes.

X Q. 27. I repeat my question: In the case of young beer, not lager beer at all, after it has been drawn off from the vats into the ruh casks and placed in a cool cellar where the temperature is below forty degrees, I will ask you if the foam rises and flows freely out of the bung-holes if they are open?

A. The amount of foam that is produced under these circumstances is not usually sufficient to overflow.

X Q. 28. Then it does not overflow?

A. Not under ordinary circumstances.

X Q. 29. I observe that when you were answering questions on your direct examination you were reading very freely answers from a book; will you state very briefly, now, what that is?—a paper pamphlet with red cover.

A. It is a pamphlet containing the proceedings of the New Process Fermentation Company against Jacob and Peter Baltz, of Philadelphia, a suit pending in equity in the eastern district of Pennsylvania, in the United States circuit court. By agreement between the counsel for complainant and the counsel for defendant in this case, I was permitted to read the testimony which I gave in the Baltz case, in order to economize time, as far as the answers in that case were responsive to the questions asked by Mr. Cotzhausen.

Counsel for defendants moves to strike out the last part of the answer as not responsive to the question.

X Q. 30. Your answers, then, as they appear in that printed book which you now hold in your hand, you have read *verbatim* largely to questions propounded to you by Mr. Cotzhausen, as I understand you?

A. As far as my answers given in the Baltz case were responsive to the questions asked me in the direct, I read them, usually without material change, from the book I now hold in my hands, but this was by agreement, as I understand it, between the counsel.

X Q. 31. In your opinion, Mr. Haines, these answers that you gave, defining the Meller and Hofmann apparatus and process, illustrating its characteristics and its advantages, in your judgment, fitted the case of an automatic vent-bung just as well as the water column apparatus, did they not?

A. In so far as an automatic vent-bung acts truly automatically, the same effects would be produced as with a water column.

X Q. 32. And any advantage possessed by the latter would also be possessed by the former, would they not?

A. Any vent-bung which would continue to act automati-
190 cally and would produce under all circumstances the same equable, constant pressure as the water column, would produce the same effects as the latter.

X Q. 33. I repeat the question: And then any advantages possessed by the water column would also be possessed by the other device, would they not?

A. With the conditions of my answer still applying, all the advantages of a water column would be obtained by an automatic bung.

X Q. 34. And those conditions are that the bung should be kept clean so as to act freely, are they not, and without stoppage?

A. It must not only be kept clean, to act freely without stoppage, but it must be so constructed that the pressure shall at all times be the same, whatever the temperature or other conditions to which they are subjected.

X Q. 35. And the degree to which this was done would depend upon the skill of the mechanic, would it not?

A. It would, to a very considerable degree.

X Q. 36. Referring to the testimony which you gave in the Baltz case, you were asked, on page 72, in substance: After stating that you had read the testimony of Mr. Hofmann as to the mode and manner of operation of Guth's apparatus, you were asked whether that mode of process of treating beer by the Guth apparatus when in the kraeusen stage in shaving casks was any different from that described in the Meller and Hofmann patent, and did you not answer that the two were precisely the same in principle?

A. I answered that the two were exactly the same in principle.

X Q. 37. The Guth bung was simply a weighted valve, was it not, and no water column whatever was used?

A. Such is the case.

X Q. 38. And it is the same one as described in the letters patent granted to H. Guth, dated March 9, 1880, No. 224,368, is it not?

A. It is the same.

X Q. 39. What other cases did you say you had testified in besides the Baltz case, on behalf of the complainant?

A. I believe I have testified for the New Process Fermentation Company in only one other case—that against Kaltenbach.

X Q. 40. Where was that pending?

A. That was in the western district of New York, at Buffalo, I think.

X Q. 41. Do you know anything about the Muhlhauser case, at Baltimore?

A. I think I am not acquainted with it.

X Q. 42. You said that the use of water columns dated back many years; I will ask you to state whether you mean by that that the weight of water in a column has been used to regulate the fermentation of malt or vinous liquors in closed vessels for many years past?

A. I do not know that the water column has been used for that specific purpose many years, but it has been long employed to regulate the pressure of gases generated in closed vessels by one process or another.

X Q. 43. Do you mean in process of distillation in the chemical laboratory?

A. I have used it to regulate the pressure in carbonic acid gas apparatuses, where I was generating that gas by the action of acids and carbonates.

X Q. 44. You are familiar with what is commonly called the wash bottle in chemistry or in chemical operations?

A. Perfectly.

191 X Q. 45. Now, then, had you ever heard before you were employed to examine the Meller and Hofmann patent of the use of a water column to regulate the pressure of malt or vinous liquors while in the state of fermentation in closed casks?

A. I think I had not.

X Q. 46. Had you ever heard, before you were employed to examine the Meller and Hofmann patent, of the use of automatic devices for regulating the pressure of gases upon beer in closed vessels during fermentation?

A. I think I had not heard of such apparatus in connection with beer specifically, but have in connection with other fermenting liquids.

X Q. 47. Had you ever heard of any such device being used by distillers for such purpose—distillers of alcoholic liquor, for such purpose—before you were employed to examine the Meller and Hofmann patent?

A. The only use of an automatically acting valve which I had heard of in connection with fermenting liquors before investigating the Meller and Hofmann process was used, I believe, chiefly, if not entirely, in the preparation of wines.

X Q. 48. Where was that, and when?

A. An account is given of it in Musprat's Dictionary of Chemistry, in which I had read it.

X Q. 49. And that is all you knew about it prior to the time I spoke of?

A. Such is the case.

X Q. 50. You say you have examined the drawings and descriptive parts of the letters patent granted to Meller and Hofmann carefully, did you not?

A. I did.

X Q. 51. Will you please tell me what you understand by this language which I now read to you from the second page, second column, beginning with line 21: "It is obvious that means other than a water column may be adopted for equalizing the pressure of the gas, without departing from the spirit of our invention—as, for example, safety-valves and the like—and the apparatus is susceptible of many other variations without affecting the process itself, which constitutes the essence of our invention." Do you regard that as true?

A. The statement is undoubtedly correct.

X Q. 52. Are you familiar with the principles of mechanics generally?

A. I believe I am. I have devoted almost as much time to the study of physics as to the study of chemistry.

X Q. 53. Were you at the Centennial Exposition in 1876?

A. I was.

X Q. 54. Did you see that great Corliss engine that moved the machinery in the mechanical department?

A. I did.

X Q. 55. Did you see a small one, a model of it, a very diminutive —, standing one side of it, about one-hundredth or one-thousandth of the size of the large one?

A. I do not remember whether I did or not.

X Q. 56. Suppose the small one was there, if you did not see it, made precisely like the large one in every respect; that its boilers would bear a pressure of one pound to the square inch of the same; the boiler of the large one would bear a pressure of from 280 pounds to the square inch. Does that fact make any difference in the principle by which those two engines were operated, the one be-
192 ing exceedingly small, the other very large?

A. Pressure in the one being proportionately small and in the other proportionately large, the principle is the same.

X Q. 57. Is there any difference in the action of the weight of the column of fluids of different specific gravity in resisting pressure?

A. The shorter column of a heavy liquid will produce as great a pressure as a taller column of a lighter liquid.

X Q. 58. Is the principle upon which they operate the same or different?

A. The principle is the same.

X Q. 59. How many inches of mercury will equal a given column of water in length?

A. Roughly, we consider an inch of mercury to be equal to a foot of water.

X Q. 60. And the pressure of a column of water 32 feet high or about that is equal to the pressure of the atmosphere, isn't it?

A. It is.

X Q. 61. Fifteen pounds to the square inch?

A. Yes, sir.

X Q. 62. How many inches of mercury would produce that pressure?

A. From 30 to 31 inches, or about 30 inches.

X Q. 63. Take the Sturm mercury gauge, for instance; if you wanted to increase the pressure upon the beer all that would be necessary would be to add to the mercury, would it not—the height of the mercury column?

A. The height of the mercury column would regulate the pressure; increasing the column of mercury would proportionately increase the pressure.

X Q. 64. Would there be any mechanical difficulty in increasing the quantity in a mercury gauge like that Gen. Sturm describes?

A. There would be no mechanical difficulty in increasing the column of mercury.

— Q. 65. Is the amount of water that is to be used in the Meller and Hofmann water column to be determined by the superintending brewer?

A. Such is the case, although it is recommended that a pressure of about seven pounds be used, and consequently a height of water corresponding to that is advised.

X Q. 66. That would be how many feet?

A. Rather over than under fourteen feet.

X Q. 67. And a less quantity of water than that would produce a less pressure?

A. It would.

X Q. 68. These apparatuses of Meller and Hofmann are furnished with a faucet at the bottom for drawing off any water that the brewer does not want to use, are they not?

A. Such, I believe, is generally the case.

X Q. 69. And they use it for drawing off all the water, when they want to be clean, to put clean water in—fresh water?

A. That is done when the change is necessary.

X Q. 70. Well, isn't it a fact, Professor Haines, that the water in these water columns which are used for regulating the fermentation of beer in closed casks becomes frequently filthy and dirty and sour by the constant escape of gas through it so that it has to be changed?

A. It would be necessary to change the water from time to time for the reason that you speak of.

193 X Q. 71. And when that change is made the casks have to be cut off from the connection of the water column by the cocks at the top, do they not?

A. If the change is made while fermenting casks are connected with the column, it would be desirable to cut off the communication between the casks and the column by shutting the cocks.

X Q. 72. Isn't it a fact, further, that when these water columns are used, as shown in the Meller and Hofmann apparatus, that the water becomes, by the passage of carbonic acid through it, frothy and light, and foams over and slops upon the ground out of the water-cock?

A. I am not aware that such is the case, nor should I think in a well-conducted apparatus that this would be liable to ensue.

X Q. 73. Have you any knowledge as to when shavings casks were first used in the second stage of active fermentation of beer?

A. I believe they were first introduced into general use fifteen or sixteen years ago.

X Q. 74. May they not have been used as far back as 1860 in several cases, by brewers, for all you know?

A. It is quite possible that they might have been used that early and I might have no information upon the subject.

X Q. 75. Speaking of the testimony of Gen. Sturm, you say that your judgment is that the time he used his mercury column or his devices, the three devices of which he speaks, was during the slow or the gradual fermentation while the beer was in what are called the

ruh casks. Now, on page 54, he says this: In being asked at what stage he used the mercury gauge, he says: "All that I do know is that some time after I attached my devices an active stage of fermentation would set in and foam would arise sufficient to interfere with the working of my devices in figure 1 and figure 2." Could that have been in the slow fermentation of which you speak while the beer was in the ruh casks?

A. This would have been quite possible in the latter stage of the treatment of ruh casks. When the last portion of the beer had been added the ruh casks would be quite full, and even a very slight fermentation would cause some foam to arise, which, if it entered the devices here, would have a tendency to clog them and stop their action.

X Q. 76. Now, would you understand, when Gen. Sturm says that an active stage of fermentation set in, that the beer was in ruh casks in a cool cellar or a cool room?

A. If the General had actually looked through the walls of the casks and had seen a very active state of fermentation going on, I would not regard it as having been in ruh casks; but in a opaque barrel with a tightly closed bung, it would be difficult or impossible for one, especially one not familiar with brewing, to judge of the activity of the fermentation. If enough foam arose to stop the valves it would be very easy to suppose that active fermentation were taking place, even though the fermentation were not great.

X Q. 77. Supposing he says that these devices were applied to casks of beer in such a stage of fermentation that foam containing particles of yeast would frequently pass out from the vent of the bungs, when they were used, and into the water barrel, when the mercury gauge was used, would you understand by that language that he would mean the slow process of fermentation which the beer undergoes in ruh casks?

A. Since all the gaseous products of fermentation would
194 have to escape from quite a large cask through a small opening, if the casks were well filled, even though the fermentation were slow, such as takes place in the ruh casks, there might, and probably would, be more or less foam condensed into the tubes leading from the vent-holes and carried into the water-barrel.

X Q. 78. That was not the question that I asked you, not what might be; but I ask you whether you would understand from that language as used by Gen. Sturm that he meant that particular stage known as the ruh-cask fermentation?

A. Without knowing how much foam was expelled, it would be impossible to judge conclusively whether the operation was conducted in the ruh casks or not; but there is nothing in his language which I think contradicts the idea that the fermentation was taking place in the ruh casks.

X Q. 79. Do you now state that active fermentation of the kind mentioned by Gen. Sturm ever takes place when beer rests in ruh casks, as an actual fact?

A. An active fermentation does not take place in the ruh casks, but it must be remembered that the gaseous products of even slow

fermentation, if obliged all to escape from a bung-hole, would be liable to carry with them considerable foam and other solid matter.

X Q. 80. But if the General says on his hypothesis now that the casks to which his devices were applied were in such an active stage of fermentation that the bungs he first used would not answer, and he had to take them off and put the mercury gage on the same casks, and that that fermentation was still so active that it passed into the wash-barrel, would you understand by that that it was in the ruh casks or in the kraeusen stage? Please give me a direct answer to that question; which of those would you understand him to mean?

A. Without knowing the quantity of foam escaping, it would be difficult to tell which stage was referred to.

X Q. 81. Why, then, did you say, in your answer to Mr. Cotzhausen, that you understood him to mean from his testimony that it was the ruh casks, if it is now difficult for you to tell?

A. Because, as I then stated, the witness stated that the beer in these casks to which the apparatus was applied was intended for lager beer and was undergoing the second stage of fermentation. Now, at the time that these apparatuses which he speaks of were employed, namely, 1860, the kraeusen process in shavings casks had not, as far as I am informed, been introduced. The only understanding that I can have of the matter is that the beer was in the ruh casks undergoing the after or second stage of fermentation, as he calls it.

X Q. 82. And yet you say that an active fermentation like he describes never takes place in the ruh casks, do you not?

A. Such a statement I do not make. I wish to have it distinctly understood that in the ruh casks an active fermentation does not take place, and if the witness had been able to look into the casks themselves, and not merely at the products going out of the bung-hole, he then could have testified in regard to the activity of the process; but as I have previously stated, even a slow fermentation taking place in a large vessel could send enough foam out of a vent-hole to give the appearance, to one not entirely familiar with brewing, of active fermentation.

X Q. 83. Do you know what the untergahrungs state of beer is, of which he speaks on the bottom of page 53?

195 A. I understand by untergahrungs, the after fermentation.

X Q. 84. Is this slow or active?

A. This is slow.

X Q. 85. And not active?

A. Not usually.

X Q. 86. Do you know, is there any difference in upward and downward fermentation in the manufacture of beer?

A. In what respects do you refer to?

X Q. 87. Well, do you know what I mean when I speak of the downward fermentation of beer?

A. I think I understand your use of terms, but I do not know what differences you wish me to explain.

X Q. 88. At what temperature does lager beer ferment in the vat?

A. At a low temperature.

X Q. 89. Well, can you give me what degree?

A. I believe the temperature of 40 or thereabout.

X Q. 90. Any higher than that, or is it generally lower?

A. The temperature, I believe, is kept under rather than above that.

X Q. 91. Isn't it a fact that at a temperature under 40 the yeast plant will not grow at all, and there cannot be any such thing as fermentation?

A. Such is not the case, as I have myself fermented liquids placed on ice itself.

X Q. 92. Will beer ferment below 40?

A. I have never tried it, but I have no doubt that a slow fermentation will still go on.

X Q. 93. Isn't it practically quiescent, the beer, while it is in the ruh casks, at a temperature of 40 degrees, not to exceed 42?

A. I have before stated that the fermentation is slow.

X Q. 94. Isn't the beer practically quiescent while in the ruh casks, at a temperature not exceeding 42 degrees?

A. At that temperature there would be very little carbonic acid gas given off, and the fluid would be comparatively quiescent.

X Q. 95. Referring to the Wallace patent, isn't the temperature of cellars where the ruh beer casks are placed generally about 36 degrees?

A. I believe brewers do not wish to have the temperature of the cellar rise much above 40.

X Q. 96. Well, isn't it a fact that they generally keep them at 36, or don't you know?

A. I do not know that this temperature is the specific one that is mostly used. They do not wish to have it rise high enough to have active fermentation commence again.

X Q. 97. When a second fermentation is desired, what is called kraeusen or new beer is added to the beer in the ruh casks; how does this produce fermentation? Does it increase the heat of the mixture?

A. It does so in two ways; it adds a fresh amount of yeast cells in a young and vigorous condition. In the second place, it adds a fresh amount of saccharine material, which is susceptible of fermentation, and therefore gives material for that action.

X Q. 98. Is heat developed by the motion of the particles?

A. Heat is developed by this process of fermentation, just as by all other fermentive actions.

X Q. 99. In your answer to question 10, you speak of the treatment of beer in ruh casks before shavings casks were introduced. You say that "the beer was allowed to remain at a low tem-
196 perature for a number of weeks or months," in the ruh casks, "during which time a very slow fermentation took place, and various chemical changes are produced in the beer. Most of the yeast was deposited, and the beer itself, while it became more highly alcoholic, gradually grew flat through the escape from it of the carbonic acid gas. Before drawing off the beer for use, in order

that it might be charged with an excess of carbonic acid gas to give it life and a pleasant taste, it was the custom to bung a cask up, by which any further generated carbonic acid gas was dissolved in the beer, giving it the desired effervescing qualities." Where did you get that statement as to this method which you have described?

A. This method of treating lager beer in ruh casks I abridge from descriptions given me of the manufacture of beer under the old process by brewers, and also from reading articles on the subject.

X Q. 100. Well, tell me what brewers you refer to.

A. I refer chiefly to Mr. Bartholomae and men connected with his establishment.

X Q. 101. Do you know how old Mr. Bartholomae is?

A. I do not.

X Q. 102. That is not the treatment for lager beer, the one I read you, is it? the treatment of the latter being gradually and not like that mentioned in your answer to question 10; that is to say, — the treatment of new beer the kraeusen is added all at once, while in the case of lager beer it is not. Isn't that the fact?

A. The description that I gave was a brief *résumé* of the manufacture of lager beer. It is true that the wort, after its first fermentation, was added a little at a time; but the process of clarification, which I was chiefly aiming at in that description, was such as I have spoken of.

X Q. 103. Isn't it a fact, Prof. Haines, that the clarification of the beer in after stages depends principally and chiefly, if not almost entirely, upon the temperature which it receives in the mash?

A. The speedy or less rapid clarification of the beer will naturally depend, other things being equal, very considerably upon the composition of the beer, and this in turn will depend upon the extent and character of the fermentation in the mash. Now, since the character and intensity of this fermentation in the mash will depend more or less upon the temperature, it follows that indirectly, therefore, the clarification of the beer, other things being equal, will depend to a certain extent upon that temperature.

X Q. 104. Do you mean to say that any fermentation takes place in the mash at all?

A. I misunderstood your question. I thought you referred to or made use of the term wort, instead of mash. Now, to answer your original question, upon the temperature of the mash will depend, to a certain extent, the chemical composition of the wort, and, therefore, the character and rapidity of fermentation and settling.

X Q. 105. And isn't it a fact, then, that the skill of the brewer in regulating the temperature of the mash will so determine the character of the beer that its clarification will be rapid or slow?

A. Other things being equal, subsequent treatment being the same, such is the case; but subsequent treatment being different, beer made from the same mash may settle slowly or rapidly.

X Q. 106. And the control of the pressure of the gas in the fermenting casks by any automatic device which works freely and easily will effect the same result, will it not?

197 A. Such I believe to be the case if the automatic pressure be applied before the settling has taken place.

X Q. 107. Take two mashes which have received different temperatures, apply any after process of treatment you please, can the clarification in either case be changed, hindered, or increased by such treatment?

A. In my opinion the after treatment will have much to do with the rapidity of the clarification.

X Q. 108. No matter what the temperature may previously have been while in the mash?

A. No matter what the temperature in the mash the subsequent treatment will effect the rapidity of the clarification.

X Q. 109. What is the function of the water column in the Meller and Hofmann apparatus?

A. It is automatically to produce and maintain a suitable pressure within the casks, and to prevent the ingress of air.

X Q. 110. In your opinion, is there any difference in the operation of the mercury gauge of Gen. Strum and the water column of Meller and Hofmann, in principle, without regard to the amount of pressure?

A. Without regard to the amount of pressure, the principle is the same.

X Q. 111. Is the principle affected by the amount of pressure?

A. The principle itself is not affected although its application would be.

X Q. 112. A better result is produced by one pressure than by another, is it not?

A. A better result is obtained by the greater pressure.

X Q. 113. In the Wallace patent, what is the function of the water in the vat C?

A. The object of the water in tank C is to produce with the pipes G a water-trap which shall allow the escape of the carbonic acid gas from the fermenting vats without allowing atmospheric air to pass into them.

X Q. 114. Your objection to the devices first used by Gen. Sturm, as I understand you, were that they would become clogged by foam, would they not?

A. They would be liable to be clogged by foam, if any should arise, and unless made of material which was not affected easily, they would be liable to rust through the agency of the carbonic acid gas and other gaseous compounds escaping through them.

X Q. 115. Is it not necessary that the yeast in the fermenting vats shall be thoroughly stirred up and mixed with the liquid in making beer?

A. In all fermenting liquids where we desire a rapid fermentation, it is desirable that the yeast should be more or less agitated in order that it may come in contact with all parts of the fermentable fluid. The same is true of beer as of other fermenting fluids.

X Q. 116. Does rapid fermentation hasten clarification?

A. I cannot give you a positive answer in regard to this matter, but I would judge that it would not, for the more rapid the fermen-

tation the greater the production of yeast cells to settle, and consequently the greater amount of matter to be precipitated during clarification.

X Q. 117. Do not these cells settle quicker in lager whose vitality is exhausted by rapid fermentation than in lager that is undergoing a slow fermentation?

A. Yeast cells always settle more quickly in an exhausted than in a fertile liquid.

198 Which were all the questions propounded upon the cross-examination; whereupon the examination was continued by Mr. DYRENFORTH as follows:

R. D. Q. 69. By reading the Wallace patent, do you understand that the gases from the vats A and B flow into the water in the tank C continuously or only at intervals for relieving excessive pressure in those vats by turning the handle of the two-way cock?

A. My understanding of the matter is that the gases do not flow continuously through the vent, but only when the two-way cock is turned, and this is done when there is an excess of gas in the vats and it is desired to relieve them of their excessive pressure.

R. D. Q. 70. To perform the office of a water-trap, as you have described the tank C to be, how far is it necessary that the pipes G should extend down into the water?

A. It would be necessary to have them extend simply below the surface of the water; a distance of an inch or two would accomplish the object.

R. D. Q. 71. Are water-traps of that character for collecting gases, relieving pressure, and excluding air from a generating vessel old or new in the arts?

A. They are old, having been employed for many years.

R. D. Q. 72. Is pressure a necessary function of the tank C in — Wallace patent, as you understand it?

A. As I understand it, the water in tank C simply acts as a trap and not to produce pressure.

R. D. Q. 73. Well; do you consider tank C in the Wallace patent to be the equivalent of the water column employed by Meller and Hofmann?

A. The object of the two being different, I would not regard it as the equivalent of the other.

Cross-examination continued by Mr. JACOBS:

X Q. 118. You say the water in the Wallace tank is used to exclude air. When there is a pressure going out through the pipes, could any air enter any way?

A. The well-known law of the diffusion of gases, by which any two gases brought in contact will intermingle against the force of the attraction of gravitation and contrary to other forces also, will permit, as can be shown by experiment, one gas to pass up and mingle to a certain extent with another gas that is escaping from an opening; therefore, if there were no water-trap, it would be possible, by this diffusion of gases, especially when the pressure in the ferment-

ing vats was not great, for atmospheric air to diffuse up the pipes and into the vats. This action, of course, would be slight, but the water-trap prevents this entirely.

X Q. 119. Don't you understand that the two-way cock of Wallace's has two discharge mouths, and it is at once set by the operator so that one will lead into the pipe going into the other vat and one into the down pipe G going into the water, so that gas may be discharged by both at the same time?

A. As I understand it, in order that both vats may discharge their surplus gas, it is necessary that both cocks, H and H′, should be opened; it would be impossible for both vats to discharge through the same pipe G by turning one cock only. By turning one cock only, either the one vat or the other may be vented of its surplus gas according to the cock that is turned.

WALTER S. HAINES.

199 It is stipulated by counsel that the complainant's counsel may produce at the hearing and read from certified copies of the two applications for patents by Clement A. Maus, referred to in the defendant's testimony, without formally offering the same in evidence.

Defendant's counsel objects to the translations offered in evidence before his arrival, on the ground that the originals were not produced, nor have defendants had any opportunity to compare said translations with the originals to ascertain their correctness. Defendant objects also to any translations of articles appearing during the year 1879 or since as incompetent and irrelevant.

It is now agreed that the Wallace Improved Fermentation Company of Indianapolis, Indiana, have brought suit against Anton Meyer, of Terre Haute, in equity, in the United States circuit court for the district of Indiana, for infringement of the letters patent issued to George Wallace on the fifth day of March, 1867, No. 62581; that the cause of action complained of is the use by Meyer of a water column to regulate the pressure of gases in one or more closed fermenting casks; and defendant's counsel are also informed and believe that Meyer is licensed under the Meller and Hofmann patent to use the same, and that it is the use of this apparatus that is regarded as an infringement.

STATE OF ILLINOIS, } *ss:*
Cook County, }

I, Charles T. Brown, a notary public in and said county, in the State aforesaid, hereby certify that all the proceedings aforesaid were had, as stated, in the cause named in the caption hereto; that I was attended by the counsel named in said caption at the time and place therein stated, and by the witness, Walter S. Haines, who was of sound mind and lawful age; that said witness was first duly sworn to testify the truth, the whole truth, and nothing but the truth in said cause; that his deposition was reduced to writing in my presence, and from his statements, and that after carefully reading the

same over he subscribed the same as and for his deposition in said cause.

I further certify that I am not solicitor or of counsel for either of the parties in said cause, nor in any way interested in the event of said cause, and that the witness resides more than one hundred miles from the place where said cause is pending.

In witness whereof I have hereunto set my hand and notarial seal this 18th day of November, A. D. 1882.

[NOTARIAL SEAL.] CHARLES T. BROWN,
Notary Public.

I further certify that the foregoing was all the evidence produced, offered, or used by either of the parties at the hearing of this cause.

THOMAS DRUMMOND,
Circuit Judge.

200 And afterwards, to wit, at the May term of said court, on the 25th day of June, 1884, before the Honorable William A Woods, one of the judges of said court, the following further proceedings in the above-entitled cause were had, to wit:

Comes now the complainant, by counsel, and files its appeal bond with George Bartholomae and Otto Zweitusch as sureties thereon, which bond is approved by the court.

Copy of Bond.

Know all men by these presents that we, The New Process Fermentation Company, and George Bartholomae, of the city of Chicago, in the State of Illinois, and Otto Zwietusch, of the city of Milwaukee, in the State of Wisconsin, are held and firmly bound unto Magdalena Maus, Albert C. Maus, Frank A. Maus, and Mathias A. Maus, of the city of Indianapolis, in the State of Indiana, in the penal sum of one thousand dollars ($1,000), lawful money of the United States; for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, and administrators, jointly, severally, and firmly, by these presents.

Witness our hands and seals this thirteenth day of June, A. D. 1884.

The conditions of the above obligation is such that whereas
201 the said Magdalena Maus, Albert C. Maus, Frank A. Maus, and Mathias A. Maus did, on the twelfth day of June, A. D. 1884, in the circuit court of the United States for the district of Indiana, recover a final decree against the above-bounden New Process Fermentation Company, dismissing its bill of complaint and for costs of suit, from which said decree the said New Process Fermentation Company has prayed for and obtained an appeal to the Supreme Court of the United States:

Now, therefore, if the said New Process Fermentation Company shall duly prosecute its said appeal with effect and, moreover, pay the amount of the decree, interest, damages, and costs, rendered and to be rendered against it in case the said decree shall be affirmed, in

said Supreme Court, then the above obligation to be void; otherwise to remain in full force and virtue.

NEW PROCESS FERMENTATION CO.,
By GEORGE BARTHOLOMAE, *Pres't.* [SEAL.]
GEORGE BARTHOLOMAE. [SEAL.]
OTTO ZWIETUSCH. [SEAL.]

Approved.
June 24, 1884.

THOMAS DRUMMOND.

202 UNITED STATES OF AMERICA, } ss:
District of Indiana, }

I, Noble C. Butler, clerk of the circuit court of the United States within and for said district, do hereby certify that the above and foregoing is a full, true, and complete transcript of the record in the cause of The New Process Fermentation Company against Magdalena Maus and others, as fully as the same remains upon the records now in my custody.

Witness my hand and the seal of said court, at Indianapolis, in said district, this 13th day of August, A. D. 1884.

[Seal Circuit Court of the United States, District of Indiana.]

NOBLE C. BUTLER, *Clerk.*

Endorsed on cover: Indiana C. C. U. S. No. 298. The New Process Fermentation Company, appellants, *vs.* Magdalena Maus, Albert C. Maus, Frank A. Maus, & Mathias A. Maus. Filed 15th September, 1884.

122-418

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CLERK

Supreme Court of the United States,

OCTOBER TERM, A. D. 1886.

No. 298.

THE NEW PROCESS FERMENTATION COMPANY
Appellant,

vs.

MAGDALENA MAUS, ALBERT C. MAUS, FRANK A. MAUS AND MATHIAS A. MAUS.

Appeal from the Circuit Court of the United States for the District of Indiana.

Brief of Argument of Banning & Banning for Appellant.

EASTMAN BROS., LAW PRINTERS, 187 WASHINGTON ST., CHICAGO.

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[Seal Circuit Court of the United States, District of Indiana.]

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120-418

Supreme Court of the United States,

OCTOBER TERM, A. D. 1886.

No. 298.

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vs.

MAGDALENA MAUS, ALBERT C. MAUS, FRANK A. MAUS AND MATHIAS A. MAUS.

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THE NEW PROCESS FERMENTATION COMPANY
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vs.

MAGDALENA MAUS, ALBERT C. MAUS, FRANK A. MAUS AND MATHIAS A. MAUS.

Appeal from the Circuit Court of the United States for the District of Indiana.

STATEMENT.

This is a bill in equity founded on letters patent of the United States, No. 215,679, issued May 20, 1879, to George Bartholomae, assignee of Leonard Meller and Edmund Hofmann, for a new and useful apparatus and improvement in processes for making beer. Appellant is owner of the patent by assignment. On final hearing on the merits, the bill was dismissed for want of equity, the Court, Drummond, J., holding in substance that the patent was void or not infringed; and to reverse this decree the complainant now brings the case by appeal to this Court. The questions involved simply relate to the validity of the Meller and Hofmann patent, and infringement thereof by appellees.

ASSIGNMENT OF ERRORS.

1. The Circuit Court erred in dismissing the complainant's bill of complaint herein.

2. The Court erred in not entering a decree in the complainant's favor pursuant to the prayer of said bill.

3. The Court erred in considering that the Meller and Hofmann patent, or any claim thereof, was void.

4. The Court erred in holding that no claim of the Meller and Hofmann patent was infringed by the apparatus and processes employed and used by appellees.

5. The Court erred in considering that the Wallace and Hicks or similar devices were capable of being used or ever had been used for the same purposes as the Meller and Hofmann invention.

6. The Court erred in holding that, in view of the previous art, the Meller and Hofmann invention was not patentable as a process.

7. The Court erred in holding that the mechanical appliances used by the appellees were not substantially the same as the mechanical appliances described in the Meller and Hofmann patent.

BRIEF OF ARGUMENT FOR APPELLANT.

PRELIMINARY REMARKS IN REFERENCE TO INVENTION.

The Meller and Hofmann invention will be fully explained hereafter, but it may be here stated that its objects are, first, to facilitate the ripening or clarification of beer, and to prevent wastage, fouling of cellars, etc.; and, second, to conduct the excess of gas generated from one cask into another so as to equalize the pressure in all the casks and thus make the beer of uniform quality. These objects are accomplished by the peculiar method of treating beer while in the process of fermentation pointed out in their specification—that is, by bunging it in a particular way and at a particular stage in the course of its manufacture, so as to control and utilize the accumulating gas for the purposes of fining and clarifying. The patent also contains a full and clear statement of the old method of brewing, from which, as well as from all the evidence, it will be seen that a very

decided advance has been made—in fact, that the invention has revolutionized the art of brewing.

As explained by Professor Haines,—

> The Meller and Hofmann system accomplishes "many results which had not before been obtained, and it acts, in doing so, in this way: Automatically regulated pressure is applied to the casks during the process of active fermentation, and air is thereby, of course, excluded. Under this increased pressure and the exclusion of air, fermentation takes place more regularly, and the impurities in the beer settle more rapidly. By the exclusion of the air, moreover, fewer impurities are produced, for it is a demonstrated fact that when oxygen is excluded from a fermenting mixture, fewer yeast cells and other solids are generated. Not only is there, therefore, produced less matter to subside, but by the increased pressure these particles are rendered specifically heavier, and therefore settle much more rapidly. The process, therefore, if applied during the stage of active fermentation, not only regulates the fermentation, but will 'materially hasten' the clarifying of the beer, both of which are objects not obtained, so far as I know, by any previously used process or apparatus." Record, 178.

GENERAL REMARKS ABOUT BREWING.

The manufacture of beer is not confined to any particular country. It would be extremely difficult to trace its origin. From the most primitive forms and methods, it has gradually developed, so as to become of late as much a matter of science as of trade. The manufacture of beer, as now practiced, from the first steeping of the grain down to the final finish of the liquid for purposes of consumption, embraces a continuous chain of chemical processes. It is a constantly progressing art; and especially during the last twenty years, science and inventive skill have strenuously combined to overcome the chemical difficulties to which this most delicate branch of industry is still more or less subject, as well as to devise mechanical appliances calculated to facilitate labor in the practical work of brewing.

The art of brewing, in Europe, as well as in this country, has become a subject of extended literature. Manifold periodicals and publications, weekly and monthly, in the

German, English and French languages, keep the public constantly advised of all new developments and discoveries, and in the nature of things, these books and printed publications cannot remain the property of a particular country. When published, they (with all that they contain) belong to the world at large. They become inseparable from our common stock of information, and form a part of the general state of the art. Curtis on Patents, Sec. 376 and note.

By aid of these numerous scientific and trade publications, we are able to closely define the general state of the art, and to trace its gradual progress from year to year—yes, month to month—with the utmost precision, and we are therefore not obliged to resort to the flippancy of oral testimony in order to draw the line between what is old and what is new. And in view of this extended trade literature and business spirit, we may well take it for granted that a new and completed invention, pertaining to any branch of this trade, cannot remain secret; on examination, we shall even find that in these periodicals pages and pages are devoted to a discussion of mere problems and experiments which eventually may or may not prove of some bearing or advantage to the trade.

OLD MODE OF TREATMENT.

In dealing with the questions presented in this case, it is unnecessary to follow or consider the intricate processes and manipulations to which grain is subjected, until converted into the beverage known as beer. Our discussion will therefore be confined to that stage in the manufacture formerly called "after-fermentation." The brewing process proper is then over. Mashing, boiling, introduction of hops and other flavoring expedients, straining of the wort, cooling of the liquid, main fermentation in open tubs or vats—all this is finished, and the beer has been drawn into larger casks or rounds—"ruh-casks" (meaning casks for rest or

storage), where it awaits its preparation and finish for market.

But in order to be marketable, the beer must be brought up to a certain standard, which it has not as yet attained. It is turbid and flat; it must be bright and clear; made to contain a fair percentage of alcohol, while retaining its carbonic acid gas, until the very time of use. Therefore the beer has yet to undergo a protracted and delicate process of clarifying or ripening, and the sugar, which is still contained in the liquid, by continued fermentation, must be further converted into alcohol and carbonic acid gas. Especially the latter is an essential element. Without carbonic acid, beer would be flat, stale. It would present itself favorably neither to the eye nor taste. Carbonic acid gives to beer the necessary "mousseux," life, effervesence; it makes it attractive to the sight, and pleasant to the palate. So that beer, while in these "ruh-casks," is by no means allowed to be at rest.

Toward a more perfect understanding of this subject, we call attention to Dr. Stahlschmidt's Chemistry of Fermentation, published at Berlin, 1868, wherein this ripening and finishing process is very extensively discussed, both as to lager (summer) and young (winter) beer. See Record, 128-133.

STATE OF ART UP TO 1868.

From said article, as well as from the one from Dr. Carl Lintner (Record, 134), the following fundamental propositions as to the state of the art in 1868 are deducible, viz:

1. The clarifying of the liquid was accomplished *during the early time* of the storage in ruh-casks, by ejecting from the bung-hole, with the overflowing hood of foam, a portion of the dead yeast and light, fluffy matter; and in a later stage, by causing the yeast and other impurities to sink and precipitate to the bottom—when not any longer prevented

by the current of ascending gas, to follow the law of gravity.

2. The casks were allowed to remain open, or but loosely bunged, until complete clarification had ensued, and the lager (invisible) fermentation had been brought to a normal state—shortly before the beer is to be used.

3. The sole object of such bunging was "to prevent the last carbonic acid gas from escaping and thus forcing it to remain in the beer, whereby the beer is made effervescent."

4. In order to guard against the bursting of the cask, and disturbance of the sediment by change of the pressure within, vent-bungs were introduced of a variety of mechanical construction, intended to give relief in case of over-pressure.

INTRODUCTION OF SHAVINGS-CASKS.

While such was the general state of the art, we find a few years later, especially on the American continent, a strong desire prevailing to curtail the time of ripening and clarifying as much as possible. In this country, since the erection of ice-houses, the storing of large supplies for summer use (lager-beer), with rare exceptions, is abandoned; brewing is continued all the year around, without regard to the temperature outside, and the demand for beer (young beer), is supplied by its manufacture from day to day. Record, 147.

Shavings-casks became in quite general use. Shavings (of white beach, hazelnut or other suitable wood) are acknowledged to be an excellent mechanical *fining* medium. On account of their porosity, they largely absorb the turbid ingredients, which are still in the beer, such as yeast, hop-tar, etc., and carry them while sinking to the bottom. Record, 135, 147.

KRAEUSEN.

When shavings-casks came into general use, the method

practiced for many years, to leave beer in the cellar five or six months, was mostly done away with. The wort, after being allowed to rest in the storage casks a short time, is pumped into the shavings-casks; the liquid at this time is comparatively flat and by no means "fine." "Kraeusen" (meaning young beer in full fermentation) is here added; a new or second fermentation (the kraeusen fermentation or kraeusen stage in shavings-casks) is now started—not so strong as the main fermentation in open vats, but still lively enough to cause, after a day or two, the cask to overflow from its bung-hole, thereby removing a portion of the lighter particles of yeast and other impurities, which are carried upwards with the current of escaping gas. It usually takes from one to two days, after the kraeusen is added, before signs of fermentation manifest themselves and the liquid shows by the formation of a foam or froth upon the surface that the yeast has commenced to "take." The duration of the kraeusen stage depends altogether upon the fermenting mediums; the character and age of the beer, as it comes from the storage casks, the quality and quantity of the "kraeusen," and the height of the temperature at which the process is conducted. Record, 146, 179,

After a while the foam sinks back, the kraeusen fermentation, at first quite lively, gradually diminishes as it commenced; it grows weaker and weaker, so as to become finally hardly perceptible to the eye. The kraeusen beer still exerts its influence; the decomposition of the malt extract into alcohol and carbonic acid gas still continues, but it has a visible limit, beyond which we can follow its progress only by the use of gauging instruments (manometers, saccharometers). As the fermenting mediums decrease, the overflowing ceases, and with it the removal of impurities from the bung-hole; the rising of the carbonic acid towards the surface becomes more and more reduced;

the ascending bubbles of gas become less frequent and constantly reduced in size.

It may be proper to state here that the definition of what is claimed to be the "kraeusen stage," contained in Vorschule der Bierbrauerei (Record, 104), is superannuated. The book was written when the use of shavings-casks was unknown. The author refers to fermentation in open vats or tubs, which is the "first or main fermentation," as distinguished from the "after-fermentation;" and Judge Drummond himself has accepted our definition of "kraeusen stage." However, the patent is very clear, and it is not believed that any difficulty will be experienced in understanding its meaning.

FININGS.

At this time, towards the very end of the kraeusen stage, when the ascending currents of gas do not any longer offer material resistance to the law of gravity, the clarifying of the beer was further accelerated and completed by the addition of isinglass dissolved in sour beer, or other gelatinous expedient. It "*fines*" the beer mechanically, by forming a scum or web, which, as it slowly sinks towards the bottom, in consequence of its specific gravity, envelops and carries down among the shavings the floating impurities that may still remain. Record, 152, 179.

BUNGING.

After a couple of days, when the beer, so treated, proved clear and bright and was intended soon to be placed in market (as already explained in relation to storage or ruh-casks), a bung was applied, in order to confine the last portions of the still slowly generating gas within the cask and force them to remain in the liquid and give it effervescence. The remaining gas thereby became mechanically bound. And in order to guard against the bursting of

the casks and over-pressure, or as it is called in brewing, "*over bunging*" (in case the beer should not be needed as soon as sufficiently charged and delays in racking off for market should occur), bungs with valves or vents were frequently resorted to. Record, 130, 133, 135–138, 149, 175.

Dr. Schwartz, editor of the American Beer Brewer, a leading brewer's journal, thus explains the art of bunging in this country prior to the Meller and Hofmann patent:

"The object of bunging is well known; it is intended to bring about a greater accumulation of the carbonic acid gas generated in the after fermentation and to impart to the beer about to be drawn off more effervescence." Record, 136. "We bung the beer in the cask in order to give the carbonic acid gas formed in the after fermentation no opportunity to escape—to hold it bound in the beer—and secure the beverage a refreshing taste." Record, 141.

"It is impossible to draw off the beer from a bunged cask, so long as the bung is fastened air-tight; and in case the bung is removed in order to render the drawing off possible, then not only will a portion of the accumulated carbonic acid gas rapidly escape, but a portion of it will also be expelled while the racking off progresses, in consequence of atmospheric air entering under a certain increased pressure, and by this mode a loss of carbonic acid is unavoidable. * * * In the methods usually practiced, an 'over-bunging' of beer often occurs, producing a turbidness by the rising of the yeast particles and sediments which have already settled in the cask. Then we usually say, 'The beer has been rising.' This evil is mostly overcome by bunging with air." Record, 138.

STATE OF ART AT TIME OF MELLER AND HOFMANN INVENTION.

When treated in shavings-casks, it was customary to add "kraeusen", which in the course of a day or two brought forth a new or second medium fermentation, whereby a portion of the impurities was carried to the top, forming a foam, and removed with the overflowage from the bung-hole. After ten to fifteen days, when the generation of gas had become reduced to a minimum, gelatine matter was introduced and the fining of beer completed.

This mode of treating beer in shavings-casks, while it secured several advantages, was still open to many objections and drawbacks, among which may be mentioned the following:

1. The overflowage during the earlier period of fermentation caused considerable loss of beer and extract;

2. The waste beer, running down the casks and on the floor of the cellars, sours and produces a mildew, which impregnates the air with foul vapors, highly injurious to the workmen, and permeating the beer in the casks, altering its flavor, and in instances where the mildew penetrates the wood of the casks, spoiling the beer entirely;

3. The washing of the casks always raises the temperature of the cellars;

4. The escaping carbonic acid fills the vaults with a gas detrimental to health and life;

5. As each and every cask was treated by itself, and as the quantity and quality of fermenting matter, as well as temperature, cannot—in the nature of things—be in all casks exactly alike, no two shavings-casks will "fine" within the same time, and be ready for racking off at precisely the same presure, and the effervescing qualities of beer will vary considerably, when put into market, much to the detriment of sales; and

6. The close attention required throughout the whole operation.

We mention these disadvantages in particular, because by the invention and discovery of Meller and Hofmann, all of them are fully overcome. But not in these particulars alone do we claim the principal merits of our patent to consist. Most of these evils are obviated as incidental merely by the use of our patented process.

ESSENCE OF MELLER AND HOFMANN INVENTION.

Prof. Haines very properly remarks that the M. & H system revolutionizes the former practice altogether. It

contracts all the various, tedious and delicate operations theretofore employed into one manipulation. It saves time, material, labor, and obviates the drawbacks above alluded to.

While of old bunging was deferred until the kraeusen stage had passed and the after-fermentation set in, these patentees bung the cask during the active fermentation and utilize the accumulating gas for the purpose of fining and clarifying the beverage; that is to say, to quickly and permanently settle, by pressure of the accumulating gas, upon the bottom and sides of the cask, all impurities which it was previously customary to remove by overflowage, fining and great lapse of time. In the words of Prof. Haines:

"The novelty and characteristic feature of the process, by which its excellent results are produced, chiefly arises from its introducing an automatically acting process at an earlier stage of the preparation of beer than has been practiced by other devices. This early bunging produces a number of valuable results, one of the most valuable of which is the rapid clarification of the beer. By placing the actively fermenting liquid under adequate automatically controlled pressure, and keeping it thus under pressure until drawn off for use, the beer ferments more equally, less sediment is produced, and clarification is more rapid and more certain. It is then, as I understand it, not the mechanical application of pressure, but the application of a suitable pressure, beginning with the second active fermentation of the beer, and continuing to the close, that constitutes the most valuable and novel feature of this process. Record, 185.

Dr. Ruschhaupt, also a distinguished chemist thoroughly familiar with the art of brewing, thus explains the invention:

"It is an acknowledged fact that the influence of pressure upon a compressible object suspended in a liquid causes it to sink, and also that pressure in closed vessels is propagated to all sides with the same force. For this reason an ascending or rising of the insoluble impurities cannot take place as long as the pressure continues or increases: however, as soon as the pressure is released or diminished a rising must necessarily result. With beer especially such rising easily occurs, and the lighter impurities will almost at once be drawn into the beer again. Any apparatus which does

not allow the pressure to become diminished at any time during the operation, and which is not apt to get out of order or become clogged, like a hydrostatic column, will avoid the drawbacks above referred to, and this object is beyond question fully accomplished by the apparatus patented to Meller and Hofmann. It is not simply a safety-valve or vent, but intended to accomplish much more, and to be used, if necessary, in the height of the kraeusen stage. But not in this respect lies the principal advantages of said patent. Its new mode of treatment is the main thing. The patent recommends automatic bunging at an earlier stage of manufacture than before practiced, viz., during the kraeusen stage, and for an entirely different purpose, viz., to hasten the clarifying and settling of the beer. The patent suggests in this respect a new and different mode of treatment before the beer is clear and settled. The new process is carried into effect by causing the liquid in the cask to be placed under an even and equal pressure of carbonic acid gas, which is uniformly applied and maintained throughout the treatment up to the very time of racking off the beer by means of an automatically working valve or weight regulated at a prefixed standard of about seven pounds to the square inch." Record, 150.

It thus appears that while bunging was formerly resorted to towards the end of the treatment, merely for the purpose of securing to the beer a certain degree of effervescence, and while it was, prior to our patent, the general understanding with brewers, as well as others engaged in fermentation processes, that "carbonic acid gas is the bearer of turbidness in fermenting liquids," and when in consequence of this, such general belief, it was customary to defer bunging and to allow the decomposition of the malt extract to go on in open casks, until the generation of gas had become reduced to a minimum, and had reached its invisible limit—even to delay the addition of fining material, until ascending currents offered no longer any resistance to the sinking of the gelatine scum—our patentees proclaimed to the world that this bearer of turbidness was a most effectual agent in clarifying the liquid, if brought into requisition and continuously controlled, at an even and equal pressure, until the beer was racked off into kegs. In a word, whereas beer had been previously clarified in *open vessels*, it is now, by the patented process, clarified in *closed vessels*.

In addition to what has already been said in reference to the utility of this process, it may be stated that the record also shows how it is regarded by practical brewers. For instance, William J. Seib, foreman at Conrad Seipp's brewery, Chicago, thus testifies:

Q. 9. Had you ever known or heard of beer in the kraeusen stage in shavings-casks being bunged before the active fermentation was over and the beer clear, until this method was suggested by Meller and Hofmann?

A. No, sir.

Q. 10. What, in the main, do you accomplish over the old mode of treatment by this Meller and Hofmann process?

A. First, I save on a thirty-barrel cask about a barrel and a half of beer; secondly, my beer will not become over-bunged; third, in the old mode of treating beer, when the liquid was two to three weeks on shavings, it became a shavings taste, which is not the case under the Meller and Hofmann method. You may keep the beer two months in the latter way. Fourth, it also involves material financial advantages, in this: If the beer is not used at the particular time, it needs not, as of old, be pumped over into other casks to guard against the results of over-bunging. There is another most important advantage arising from this early process of bunging. It prevents overflowage and the yeast souring the floors and cellars, and as the yeast is a plant and continues to grow, the atmosphere becomes corrupted, which reacts on the beer in the cellar.

Q. 11. What advantages, if any, do you obtain by connecting the casks in the manner spoken of?

A. The casks are not in even fermentation when separate. One may be slow and the other advanced. In one the fermentation may have spent its force and be departing. By connecting the casks with each other, the carbonic acid gas is equalized in all of them, and the beer will become more even. Record, 171.

Nor is this great utility of the invention disputed by appellees. On the contrary, it is clearly admitted, Mr. Matthias A. Maus expressly saying that, in his opinion as a practical brewer, it is a very important and valuable process in the manufacture of beer. Record, 70.

THEORY OF MELLER AND HOFMANN PROCESS.

By excluding the air from the cask, the foul and corrupting influences of the cellars are at once removed; fermenta-

tion, and consequently the rapid decomposition of malt extract into alcohol and carbonic acid gas, are thereby somewhat retarded; an undue formation of yeast cells and other solids is prevented, and as a natural result, the amount of impurities present is diminished.

It is also a fact, well established in scienee, that under pressure the formation and growing of yeast cells are less rapid than when no pressure is applied; and further, that the rising of the sediments and deposits in the cask, which so often occurs, with a quick change of the atmospherical conditions, is entirely prevented, if the pressure in a closed cask is higher than the difference in the pressure of the atmosphere, which pressure (as is well known) never reaches one pound per square inch.

Now, it is also a well-known truth that pressure, acting upon liquids in a closed vessel, is propagated to all sides with equal force, consequently an approximate state of equilibrium soon ensues; the pressure causes the yeast and other impurities to become denser and of a higher specific gravity; objects suspended in the liquid more rapidly subside, and as long as the pressure is not decreased, they cannot again rise, but remain motionless and buried among the shavings and fining material near the bottom of the cask. Record, 150, 180.

Considering these axioms of science, in connection with the further proposition that in consequence of the slower fermentation in closed casks, under pressure of carbonic acid gas, the union of the latter with alcohol is longer preserved and maintained—and the various advantages resulting from our theory and process will become readily apparent:

MECHANICAL MEANS.

To carry out this new process of clarification, the inventors suggest the use of a water column, exerting a pressure of not over seven pounds, or any mechanical equivalent

thereto, which operates truly automatically, so as at all times, throughout the operation and until the final racking off, to maintain and preserve an even and uniform pressure upon the liquid. But their specification also says that "it is obvious that means other than a water column may be adopted for equalizing the pressure of the gas, without departing from the spirit of our invention, as, for example, safety-valves and the like; the apparatus is susceptible of many other variations, without affecting the process itself, which constitutes the essence of our invention."

TIME OF APPLYING PRESSURE.

While it will be self-evident from the above that the pressure of the carbonic acid gas, when once applied to the liquid, must necessarily and evenly be maintained until the beer is racked off into kegs, and under no circumstances be allowed to decrease or diminish by removal or disturbance of the bung or weights, the brewer is left entirely to his own discretion, at what particular time or stage first to apply it.

The inventors suggest that automatically controllable pressure may be immediately applied—that kraeusen and fining material may be added and the casks bunged simultaneously; that in order to secure all the advantages of the invention, it is advisable not to delay this mode of bunging under automatically controllable pressure of carbonic acid gas. But it is obvious that, at whatever time or stage applied, the drawbacks of ascending currents and consequent disturbance of the liquid and sediments will thereby soon be obviated, so that the beer can readily clarify and fine. All this is a mere matter of individual taste, and not of the essence of our process.

"If the pressure is applied during the kraeusen stage the principle is the same, whether it be applied at the beginning or after it is well continued. Some of the advantages derived by the early application of the pressure would be lost if applied late; but this is a difference of quantity and not of

quality; the kind of advantages obtained would be the same, only not so great in amount." Record, 182, 151.

So that in point of practice, we find to-day hardly two brewers who conduct this finishing process in its various mechanical details precisely alike. In fact, the preliminary conditions and age of the beer wort, the quality and quantity of the kraeusen and fining material, temperature of cellars and demand in market, being so essentially different, it would be impossible, in the nature of things, to lay down one certain inflexible rule or treatment. With beer still rich in sugar and fermenting mediums, the addition of kraeusen may be altogether unnecessary; with others it may be advisable to allow the kraeusen to work out of the bung-hole for one, two or more days, and permit the gas to escape. Again, some brewers cannot apparently be made to understand that an immediate or early bunging will not tolerate the addition of fermenting mediums in quantities as large as formerly used, and that a cask in strong fermentation, although automatically closed, is like an open cask, and cannot be said to be under an even and equal pressure until the fermentation has worked down and is brought under adequate control. Such extravagant practices, as a matter of course, neither our patentees nor others can possibly guard against; and the only remedy in such cases is to refrain, for a time, from bunging altogether, and to allow the excess of gas first to escape. And what is said above as to various practices and necessities in "kraeusen" applies equally as well to the use of "finings."

But it is an indisputable, self-evident fact, that the liquid can not possibly "fine" until the kraeusen stage and development of gas has almost utterly subsided or until a pressure and equilibrium is established, which allows the impurities even during fermentation to sink and settle, without impediment of ascending currents; and this is not generally reached until after the lapse of several days.

The advantage being so decidedly in favor of the latter proposition, no brewer at present defers bunging as of old, but resorts to it while the liquid is still in a lively state of fermentation, for the purpose of clarifying his beer.

Formerly, in rational brewing, twelve to twenty days were required to clarify and finish young beer, but one-half of this time is now more than sufficient. The brewer is enabled to work as fast as in his judgment the necessities of the market will require; and if mistaken as to the quantity needed, he can keep the surplus on hand, in full life and vigor, to await his opportunities without the slightest loss or embarassment.

The pressure being once applied and automatically regulated, no further attention or manipulation is required. All the various obstacles and drawbacks attending the former mode of treating beer, may be effectually done away with by a rational use of our process. Time is gained, labor and material saved, waste obviated, accidents avoided; while at the same time the product is not only equally good in taste and quality, but more retentive and uniform in effervescence than heretofore.

All modern writers, at home and abroad, give the inventors high praise for the advance they have thereby accomplished, (Record, 133, 135, 138-140, 143) and no one, until these suits, ever disputed, in public or private, that the credit for this important invention is due and owing to these patentees.

CONNECTED VESSELS.

Another great advance in treating beer, closely allied to the foregoing art, but still characteristically different, is that feature of the Meller and Hofmann patent which involves the process of treating beer in closed connected vessels, or a series of casks, under automatically controllable pressure of gas, whereby the gas passing from one cask to another, the pressure is equalized in all and the beer made of uniform quality.

This feature of the invention is thus referred to by Dr. Ruschhaupt:

"The patent also recommends connecting a number or series of casks with each other, so that the gas may communicate from one cask to the other, and the fermentation be conducted under an entirely uniform and even pressure in all of them alike; the surplus gas from one keg [cask] will supply what may be wanting in others, and in consequence the settling and clarifying process in all of them will be more rapid, and in the end the effervescing character of the beverage will prove to be adequately even." Record, 150.

Professor Haines also says:

"Several casks being connected, and all therefore subject to the same pressure, in my opinion the fermentation would proceed more equally in all of them. The subsidence of the impurities would be more regular and the beer, therefore, be brought to a finished condition more uniformly." Record, 181.

It must be quite evident that when each and every cask is treated by itself, not only a great outlay of labor and apparatus is required, but, as the quantity and quality of fermenting matter, as well as temperature, cannot, in the nature of things, in all casks be alike, no two casks will "fine" within the same time and be ready for racking off at precisely the same pressure; the ripening of the beverage in the first instance and then the effervesing qualities will vary considerably, when put into the market, much to the detriment of sales. But when a series of casks is placed under pressure of one water-column, or other automatically working pressure-apparatus, no such difficulty will likely arise; the pressure of gas in all connected vessels will soon be equalized; the fermentation under pressure will proceed more evenly and the effervescing quality of the liquid in all the casks will naturally be uniform, whenever required by the demands of market, thereby securing another great advantage over the old mode of treatment.

PATENTABILITY OF MELLER AND HOFMANN PROCESS.

The Court below seems to have struggled over various

theoretical questions in reference to process patents; but that inventions of this character are patentable as processes we believe to be too well settled for question or argument. The law on this subject has often been the subject of consideration in Court, and may now be considered as elementary.

In *Corning* v. *Burden*, (15 How. 267,) this Court, speaking through Justice Grier, said:

"A process, *eo nomine*, is not made the subject of a patent in our act of Congress. It is included under the general term 'useful art.' An art may require one or more processes or machines in order to produce a certain result or manufacture. The term machine includes every mechanical device or combination of mechanical powers and devices to perform some function and produce a certain effect or result. But where the result of effect is produced by chemical action, by the operation or application of some element or power of nature, or of one substance to another, such modes, methods, or operations, are called processes. A new process is usually the result of discovery; a machine, of invention. The arts of tanning, dyeing, making water-proof cloth, vulcanizing india-rubber, smelting ores, and numerous others, are usually carried on by processes, as distinguished from machines. One may discover a new and useful improvement in the process of tanning, dyeing, etc., irrespective of any particular form of machinery or mechanical device. And another may invent a labor-saving machine by which this operation may be performed, and each may be entitled to his patent. As, for instance, A has discovered that by exposing india rubber to a certain degree of heat, in mixture or connection with certain metallic salts, he can produce a valuable product, or manufacture; he is entitled to a patent for his discovery, as a process or improvement in the art, irrespective of any machine or mechanical device. B, on the contrary, may invent a new furnace, or stove, or steam apparatus, by which this process may be carried on with much saving of labor and expense of fuel; and he will be entitled to a patent for his machine, as an improvement in the art. Yet A could not have a patent for a machine, or B for a process."

In *Cochrane* v. *Deener* (94 U. S., 787), Justice Bradley, speaking for the court, says:

"That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. * * A process is a mode of treatment of certain materials to produce a given result. It is an act, or series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing. If new and useful, it is

just as patentable as is a piece of machinery. In the language of the patent law, it is an art. The machinery pointed out as suitable to perform the process may or may not be new or patentable; whilst the process itself may be altogether new, and produce an entirely new result. The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence."

In *Tilghman* v. *Proctor* (102 U. S. 722–5), the court again adopt the language of Justice Grier in *Corning* v. *Burden*, above quoted, first saying:

"That a patent can be granted for a process, there can be no doubt. The patent law is not confined to new machines and new compositions of matter, but extends to any new and useful art or manufacture. A manufacturing process is clearly an art, within the meaning of the law. Goodyear's patent was for a process, namely, the process of vulcanizing india-rubber by subjecting it to a high degree of heat when mixed with sulphur and a mineral salt. The apparatus for performing the process was not patented and was not material. * * Another person might invent a better apparatus for applying the process than that pointed out by Neilson, and might obtain a patent for such improved apparatus; but he could not use the process without a license from Neilson. His improved apparatus would, in this respect, stand in a relation to the process analogous to that which an improvement on a patented machine bears to the machine itself."

As already shown, the Meller and Hofmann process is a clearly defined way of treating beer at certain stages and for certain purposes, and it consists in something more than the mere application of the apparatus used for carrying it into effect. The beer, being in proper condition, must be drawn into the shavings-casks, the kraeusen and finings added, the apparatus applied, and the beer afterwards kept under an equal prefixed pressure sufficient for clarification, until fully clarified and ready for the market. In other words, the process consists in controlling and applying a pressure of carbonic acid gas sufficient to cause the yeast and other impurities to speedily settle, while the beer is in a wild and active stage of fermentation in closed shavings-casks; and the results of the process—speedy clarification of the beer, the preventing of all over-flowage and resulting damages,

etc., in fact, changing this part of the brewing process from open to closed casks—certainly show it to be "just as patentable as a piece of machinery." Hence it is believed that, in the strictest view possible, the case falls squarely within the definition of a process as repeatedly given by this court. It is certainly "a mode of treatment of certain materials to produce a given result. It is an act or series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing." It "requires that certain things should be done with certain substances and in a certain order." In this view, the Meller and Hofmann patent cannot be held invalid even if some or all of the various steps or stages in the process should be found to be old when separately considered; for, in such case, "every successive step enumerated must be regarded as an essential part of the process." *Hammerschlag* v. *Garrett*, 10 Fed. Rep. 479.

And right here it may be proper to suggest that the patent, being for a process, the doctrine of *Pennsylvania Railroad Company* v. *Locomotive Truck Company* (110 U. S., 490), and similar cases, to the effect that it is no invention to apply an old machine to a new use, has no application. Otherwise, what is the meaning of the Supreme Court's language above quoted—such, for instance, as Justice Bradley's statement that "the machinery pointed out as suitable to perform the process may or may not be new or patentable, whilst the process itself may be altogether new and produce an entirely new result?" But, even in the case of a machine patent, the application to a new use is patentable where such new use is not similar or analogous to previous uses of the same machine. This is clearly recognized in *Railroad Company* v. *Truck Company*, in which Justice Gray, speaking for the Court, says "that the application of an old process or machine to a *similar or analogous* subject, with no change in the manner of application, and

no result substantially distinct in its nature, will not sustain a patent, even if the new form of result has not before been contemplated." But this merely recognizes a familiar principle, which may perhaps be considered an exception to the general rule in reference to double use, that the patenting of a machine or material "for one purpose does not necessarily invalidate patenting it for another different and not analgous purpose." *Jenkins* v. *Walker*, 5 Fisher, 439; *ex parte* Lytle, 1 Off. Gaz., 359.

In this connection we may be allowed to say that, in our view, the learned Judge who heard the case in the Court below was mistaken in saying that "no new principle or scientific fact had been discovered, as was true in the process patents which have already been referred to." The fact already stated that the carbonic acid gas generated in the fermenting beer, instead of continually ascending and operating as a bearer of turbidness, could be utilized in a directly opposite way—that is, made to carry or force the sediments to the bottom—was certainly the discovery and application of a new principle, or at least a principle not before known or utilized in the fermenting of liquids. As already quoted, Ruschhaupt says that Meller and Hofmann's "new mode of treatment is the main thing. The patent recommends automatic bunging at an earlier stage of the manufacture than before practiced, viz., during the kraeusen stage, viz., to hasten the clarifying and settling of the beer. The patent suggests in this respect a new and different mode of treatment before the beer is clear and settled." (Record, 150). Now whether we call this a "new principle or scientific fact" or something else, it still remains true and undisputed that it has worked wonderful results in the art of brewing—changing this part of the work from open to closed casks, saving all wastage, fouling of cellars, etc. Whatever it may be called, is not this new

mode of treatment entitled to as favorable consideration as if strictly a "new principle or scientific fact?"

THE WALLACE PATENT.

The court below refers to the Wallace invention as similar to the Meller and Hofmann, at least in a general way, in its application to the manufacture of beer. A simple examination of this patent will show that it is not in any way capable of performing the work of the Meller and Hofmann; on the contrary, it acts on a directly opposite principle and was intended to be used for a directly opposite purpose. It was designed for distilling—*stirring* up the fermenting mediums and thereby accelerating the fermentation and decomposition of the mash; whereas, as already explained, just the opposite result is sought to be accomplished by the patented process, namely, by the confined pressure the fermentation is retarded and the liquid brought to an approximate rest and equilibrium, and the impurities and yeast cells—instead of being carried to the top by the ascending currents—are made to sink and settle on the sides and bottom of the cask.

This Wallace patent is thus considered and compared with the Meller and Hofmann invention by Prof. Haines:

"In my opinion, the two are radically different. The Wallace patent introduces to the bottom of one fermenting tank a pipe which is connected with the upper portion of the other fermenting cask. Now, if any excess of pressure should occur in either cask over what there is in the other, a quantity of carbonic acid gas will be forced to the very bottom of the cask having the smaller pressure, and in this way the yeast and other sediment will be thoroughly stirred up and diffused through the fermenting liquid. This would unquestionably increase the rapidity of fermentation, but it would accomplish the opposite result of what the Meller and Hofmann process contemplates—namely, the forcing down of the sediment so as to clarify the beer and not its agitation and dissemination through the fluid. It seems to me, therefore, that the Wallace apparatus and process, as figured and described in patent 62,581, would not and could not be used for the same purposes that the Meller and Hofmann process is employed." Record, 186.

Dr. Ruschhaupt testifies in reference to the Wallace invention as follows:

A. As soon as the Wallace apparatus is applied to beer casks, and the pipes from one cask conducted to the bottom of another, then it could not be used at all.

Q. 76. Why not? What is the difference in this respect between beer and whisky mash?

A. It would stir the yeast and impurities from the bottom instead of accelerating the settling of the same, as it has to be effectuated in beer casks. The difference is as great as that between day and night. A whisky mash is a mixture of malted grain and water, while beer is a liquid containing water, malt extracts, alcohol and carbonic acid. A whisky mash is mixed with yeast to have it fermented, and the mixture is frequently stirred up to prevent the settling of the yeast, and thus effectuate a quicker fermentation.

Q. 77. How does the Wallace patent contemplate stirring up of the yeast in the mash?

A. By conducting, as I stated before, a pipe from the upper part of one cask to the bottom of another, and thus allowing the carbonic acid gas from the former to enter the liquid of the other, and to pass in form of a multitude of gas bubbles through the liquid." Record, 154.

And Wallace himself admits that he never discovered that his apparatus would effect the same results in the manufacture of beer as the Meller and Hofmann invention until 1881 (Record, 64) and then, for the first time, he began to talk about it as adapted to this purpose. His own course and evidence shows that it was an after-thought with him; but, without regard to this, it never was used and never can be used for the same purpose as the Meller and Hofmann invention.

THE HICKS PATENT.

This patent upon its face shows that it belongs to that class of early vent-bungs described by Dr. Stahlschmidt. As the application for a reissue is appended to the defendants' proofs, it may also be of interest to refer to the commissioner's decision rejecting the same, which will be found in the Commissioner's Decisions for 1879, page 200:

"The present applicant set forth in his patent that he had provided a

good and sufficient vent-plug for vessels *designed for holding* fermenting liquors, by which the same could be rendered air-tight and prevented from bursting, while such fermentation was proceeding, and which was so formed as to be automatic in its operation to allow the escape of the gases. This was the *necessary* operation of the plug when used, and the limitation of the original application, when filed, to the article would not have justified the Office thereafter in permitting its enlargement, or in now permitting the enlargement of the patent, to embrace a claim for a method of conducting the fermentation of liquors that would include all other means known and unknown for producing the same result."

It is unnecessary to add further comments. Complainant freely admits that its process can be practiced and its advantages secured, at least in part, by "any form of apparatus that works truly automatically and produces the desired pressure." But the great trouble prior to our invention was that no one had as yet discovered the advantages of such early use, and that beer in *wild, active fermentation* could be advantageously treated by applying an adequate automatic bunging-apparatus; when such discovery was finally made, it mattered not to the inventor of the new process whether the means employed were old or new. *Cochrane* v. *Deener*, 94 U. S., 788.

As repeatedly stated, the essence of the Meller and Hofmann invention does not lie in the use of certain specific mechanical means, but in early automatic bunging, at a time never thought of or suggested before.

What is here said with reference to this Hicks patent will apply generally to nearly all the other patents introduced by appellees.

THE PFAUDLER PATENT.

The Pfaudler patent was issued July 2, 1878, whereas the Meller and Hofmann invention was actually introduced and put into use in this country "in 1877; in the end of July and commencement of August." (Record, 41). It was also patented by Mr. Bartholomae, agent of the inventors, April 2, 1878, and described in the American Beer Brewer

in June, 1878; so that, saying nothing about the French patent of November, 1876, or the Belgium patent of February 28, 1877, the Pfaudler patent is clearly antedated, so far as this record shows, and cannot therefore be considered a sufficient reference. *Dixon* v. *Moyer*, 4 Wash., 68; *Smith* v. *Goodyear D. V. Co.*, 93 U. S. 486; *Bates* v. *Coe*, 98 U. S., 34; *Reeves* v. *Keystone Bridge Co.*, 5 Fish., 462; *Draper* v. *Potomska Mills Corporation*, 3 Banning & Arden, 215.

THE MAUS EXPERIMENT.

The Clement A. Maus application (Record, 107-115), shows precisely the scope of his invention. This application will of course be considered as prepared in the light of the advanced state of the art as then known. Maus had the benefit of Meller and Hofmann's European patents of 1876 and 1877, Bartholomae's patent of April 2, 1878, and the extended commentaries of Dr. Schwarz, June, 1878—and still the scope of his invention, as then applied for, is limited to certain mechanical improvements of questionable value.

But, in addition to all this, it is admitted that Maus' fruitless experiments did not reach back of September, 1877 (Record, 71), which is of course not sufficient to anticipate the Meller and Hofmann invention.

THE STURM EXPERIMENT.

That General Sturm's apparatus, so-called, was a mere experiment is apparent from his own evidence (Record, 74-83). Its use is not shown to have resulted in any practical benefit to anybody; in fact, the evidence fails to show that it was ever actually used at all. The only ones claimed to have been made were thrown aside, probably within a few months, and certainly long before the date of Meller and Hofmann's invention; so that, in any view, the case in this respect falls within the principle of *Parkhurst* v. *Kinsman*

(1 Blatchf., 494) that "crude and imperfect experiments, equivocal in their results, and then given up for years, cannot be permitted to prevail against an original inventor who has perfected his improvement and obtained his patent." See also *White* v. *Allen*, 2 Clifford, 230.

But without regard to this, Dr. Ruschhaupt says that the Sturm's apparatus was not capable of being used during the kraeusen-stage in shavings casks as contemplated by the Meller and Hofmann patent, and that "they were only applied in lager casks to prevent the bursting of the same —that is to say, to let off the surplus amount of carbonic acid gas." (Record, 157.) And Prof. Haines agrees with these views, saying:

"The forms of apparatus described and figured in the testimony of Gen. Sturm could not be practically applied for the purposes of the Meller and Hofmann process, for the bungs figured and described would certainly become clogged by the foam that is sent upward in considerable quantity during the active fermentation, and, becoming clogged, would either cease to act or else remain permanently open. The other device figured and described contemplates, according to the description, the application of a very trivial pressure, stated by the witness himself as equivalent to about a pound per square inch. As I before testified, I believe such a trivial pressure would not bring about the effects obtained by the Meller and Hofmann process, although it would be sufficient to charge the beer with a certain amount of gas and prevent the casks from bursting, which, as I understand it, was the object of the apparatus now spoken of. * * It is difficult to determine from the testimony of the witness exactly at what stage of the brewing of the beer the apparatuses were employed; but as he stated that they were made in 1860, at which time the treating of beer with kraeusen in shavings-casks was not practiced, it is evident that the apparatuses were not intended to be applied during this stage of brewing." Record 183.

In the face of General Sturms own evidence, showing his apparatus to have been experimental merely, and not showing it to have been actually used at all, and in the face of this clear judgment of two very learned chemists that it could not be used for the purposes of the Meller and Hofmann invention, can the Court say that, in any view, it amounted to anything more than a crude, imperfect and

abandoned experiment? And especially can the Court say this, in view of the very significant fact that appellees have not attempted to show that it was capable of practical use for the purposes of the Meller and Hofmann invention?

INFRINGEMENT.

As we understand the issues and proofs, infringement is not seriously denied by appellees. It is true the learned Judge in the Court below considered that there were differences between the mechanical appliances used by appellees and those shown in the Meller and Hofmann patent; but, even in a strict view, these devices may be properly considered as the full equivalents of each other. But when the true scope and character of appellant's claims are considered, there can be no possible doubt about appellees' infringement thereof; the patent cannot properly be restricted to mere forms or details of construction, and, in any view, its process claims certainly cover the process carried on at appellees' brewery. But, the case will undoubtedly have to turn on the question of the validity of the Meller and Hofmann patent, and so we do not deem it necessary to consider the question of infringement at length.

In conclusion, we respectfully submit that the record presents a remarkably strong case—the invention is undeniably one of great practical value and importance, which was never used before—and to sustain the patent would at least, in some measure, be to give encouragement to true inventive genius in the spirit contemplated by our patent system.

We respectfully ask that the decree of the Circuit Court be reversed and the cause remanded.

EPHRAIM BANNING,
THOMAS A. BANNING,
Of Counsel for Appellant.

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No. 298.

THE NEW PROCESS FERMENTATION COMPANY,
Appellant,
vs.
MAGDALENA MAUS,
ALBERT C. MAUS,
FRANK A. MAUS AND
MATHIAS MAUS.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF INDIANA.

BRIEF OF ARGUMENT FOR APPELLANT.

—BY—

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BRIEF BY W. W. LEGGETT FOR APPELLANT.

Since the brief prepared by my associate on behalf of the appellant contains a statement of the case, and of the errors assigned, the same are not here repeated, and this brief is therefore confined solely to points of fact and the law bearing theron.

REGARDLESS OF THE PROCE-S THE APPARATUS IS THE SAME.

So far as relates to the mechanism, irrespective of the process, appellant's apparatus is illustrated and described

in his patent in suit as connecting a series of shavings casks by small tap pipes leading into a common receiving pipe, which in turn leads downward to the bottom of a water column, the latter serving to exert and hold upon the fermenting beer a uniform pressure of about seven pounds, more or less, while excess of gas is permitted to escape.

The appellees, the defendants below, employed a series of shavings casks in like manner, each connected by a tap pipe with a common receiving chamber, from which chamber a single pipe led off and downward to the bottom of a water column—the apparatus operated in precisely the same manner. The tap pipe started from the bung and did not lead down into the beer.

Frank A. Maus, q. 4, p. 55.

It was materially different from the Wallace patent (*Rec. p. 85*), and was in all respects exactly like that illustrated in the cut of shavings casks in the Wallace circular. It was introduced in 1881.

Exhibit Circular, p. 105.
Frank A. Maus, q. 12, p. 60.
Matthias A. Maus, q. 3, p. 69.

I purpose to confine my remarks to only a few prominent phases of the case.

I.

COMPLAINANT'S MELLER & HOFFMAN PATENT.

Meller & Hoffman, as shown by the patent,

Record, p. 6.

first patented the invention in France, Nov. 30, 1876, and in Belgium Feb. 28, 1877. George Bartholmae hav-

ing up to the year 1877 never heard of the use of such apparatus, visited Germany on a pleasure trip, and first learned of it from Hoffman in Manheim, Baden. Being himself a German, and not understanding our laws, he returned as agent for Meller & Hoffman, for the purpose of introducing and patenting the same in the United States, and applied for and obtained a patent in his own name.

Finding, shortly afterward, that he had blundered in this respect, he had proper application papers prepared and executed by Meller & Hoffman, and applied for the patent in controversy in their name.

An informal interference was declared in the patent office between the new application and the above mentioned patent to Bartholmae. Bartholmae conceded priority of invention to Meller & Hoffman; the patent in suit issued to the latter parties, and was by them assigned to complainant, the appellant.

Geo. Bartholmae, q. 1–16, pp. 41–43.

Complainant's invention therefore dates at least prior to the French patent, November 30, 1876.

It was introduced into the United States in the end of July and commencement of August, 1877.

Bartholmae, q. 10, p. 41.

TWO PROMINENT FEATURES OF THE PATENT.

The patent presents among others two prominent features:

FIRST: *The connection of a series of shavings casks with a common gas receiver, and the leading of this gas receiver down into a water column, whereby a uniform and automati-*

cally controllable pressure is maintained, throughout the entire series, and circulation of gas permitted from one shavings casks to another, and

SECOND: *The application of the pressure to the beer* FROM THE BEGINNING OF WHAT IS DENOMINATED IN THE PATENT THE "KRAEUSEN STAGE," *being that stage which begins with the addition to the beer in the shavings casks of new beer or "kraeusen."*

STEPS PURSUED IN MAKING KRAECUSED BEER.

THE OLD PROCESS:—The old process of making beer involved the following stages:

1ST. The ingredients were prepared in the mash tun.

2D. They were then drawn off into the kettle and boiled for an hour or more. Hops were added and the boiling was continued for an hour or more longer. This constitutes the wort.

3D. The wort is drawn from the kettle, cooled to the required temperature and run into large vats, called fermenting vats, entirely open at the top. Here, yeast is added and the mass permitted to stand ten or twenty days. During the first few days the fermentation which sets in causes rolls of foam to form on top, which by reason of its curly appearance is called "kraeusen." This is the kraeusen or new beer which is used later.

4TH. This liquid is then drawn into large open casks, called ruh casks or storage casks. Here it remained in a quiescent and inert state from several weeks to six or eight months. This is for aging or ripening the beer. A slow and almost imperceptible fermentation is maintained; various mechanical changes take place; alcohol

is developed; the mass becomes flat by reason of the escape of carbonic acid gas, and though most of the yeast has settled the suspended impurities maintain the liquid in a turbid state.

5TH. When this beer is wanted for the market, it is drawn off from the ruh casks into what are called shavings casks in which are a quantity of shavings. Here new beer or "kraeusen" is added in the proportion of about one-tenth to one-quarter of the contents of the cask.

By the old process in vogue, before the Miller & Hofman invention, these shavings casks were left open at the bung. Within a day or two a violent fermentation would ensue, causing the foam and with it much of the suspended impurities, together with a considerable quantity of the beer, to work out rapidly from the bung hole over the sides of the casks and onto the floor, and new beer had to be added from time to time to supply the loss. This violent fermentation lasted for several days and then began slowly to subside. A few days later the carbonic acid gas was found to develope very slowly, finings were now added in the form of gelatine or isinglass. This, spreading out like a gauze veil, would mechanically entangle the suspended impurities and slowly settle to the bottom. During this period the ascending bubbles of carbonic acid gas would tend to buoy up the impurities and greatly retard the settling and clarifying process. Moreover, the accesss of air to the mass during this *kraeusen stage* of the process would result in the rapid growth of yeast cells and the development of many new ones, thus contributing to the production of foreign matters which must be preciptated to the bottom before clarification was completed. At the end of some twenty

) twenty-five days after "kraeusen" had been added he liquid was settled and clear. The cask was then bunged up in order that the remaining slow and almost imperceptible fermentation might accumulate a charge of gas sufficient to render the beer lively and effervescent.

1. THE NEW PROCESS.—We can now distinguish clearly the Meller and Hofmann invention. It involves several distinct branches as defined by its several claims but I will limit my analysis of it solely to that part which involves the treatment during the "*kraeusen stage*" and to the connected series of casks, since that feature of the process and that form of apparatus are the elements principally involved in this controversy and comprehend the apparatus and process employed by the defendants.

To distinguish the patented process from the old process we should observe that the procedure may, for the purpose of this inquiry, be the same down to the beginning of the *fifth* or "*kraeusen stage*," above enumerated, being that stage in which the ruh beer having been drawn into shavings casks has "*kraeusen*" or new beer added to it, or, as some of the witnesses term it, the stage where the beer is "*kraeused*."

By the Meller and Hofmann invention at this fifth stage the "*kraeusen*" is added; the cask is not left open but is immediately, or before active fermentation sets in, connected at its bung with the pipe which leads to the water column. The gas, therefore, that is developed quickly serves by the resistance of the water column to establish a pressure of six to seven pounds upon the beer, and this is maintained throughout the remainder of the process, until the beer is ready to draw off for the market. This pressure, it will be observed, is applied at the beginning of the

"*kraeusen*" stage, and not, as heretofore, delayed until the kraeusen fermentation has subsided and the beer clarified.

The effect of this new step in the process of the manufacture of kraeused beer may be summed up as follows:

1ST. By preventing access of air the excessive growth and accumulation of yeast cells, which would otherwise ensue, is prevented.

2D. There being fewer and smaller yeast cells to precipitate, the clarifying process is hastened.

3D. The pressure serves to contract the yeast cells, thus reducing their bouyancy, rendering them specifically heavier and causing them for this reason to quickly settle.

4TH. The pressure upon the beer, like the pressure in a bottle of mineral water or champagne, serves to prevent the rising of the bubbles of carbonic acid gas which would otherwise serve to buoy up the finings and impurities and retard the clarifying process.

5TH. By reducing to a few days this fifth stage of the process, which before took three to four weeks or more, reduces in like proportion the number of shavings casks required for the production of a given quantity of beer, and so greatly cheapens its production.

THE CONNECTED SERIES.—Miller & Hofmann also cover by their patent the connection of a series of shavings casks to a common pipe which leads into a water tank, in order to hold a uniform, automatically controllable pressure on all the casks—and apply the apparatus to the casks at this kraeusen stage. The advantages derived are, substantially:

1ST. Uniformity of the product in all the series of casks.

2D. No possibility of injury to the casks nor liability of one cask being overbunged and another underbunged.

3D. The hastening of the process.

4TH. Cleanliness about the cellars and consequent purity of flavor.

5TH. The automatic control of the pressure throughout the series, from one point.

6TH. The prevention of an escape of gas into the cellars.

THIS NEW PROCESS AND APPARATUS WAS NEVER BEFORE KNOWN.

It was new in the brewing literature of the day in this and foreign countries.

Rec. p. 128-131. Dr. C. Stalschmidt, Berlin, 1868, in a review of the art of brewing and distillation, described only the bunging of beer after the violent fermentation which follows the addition of "kraeusen" beer has subsided and the beer has become clear.

He makes no mention of connecting a series of shavings casks, nor of applying the bungs or pressure as soon the "kraeusen" is added.

He says:

> "In Bavaria the universal practice is, not to give to the draught beer its effervescence in the lager casks by bunging these, but on the contrary to mix the beer when it has become clarified, fined and bright in the tap-kegs, with one-tenth to one-sixth in volume of "kraeusen" beer, and then to bung the kegs *as soon as the first violent fermentation is over and the beer again begins to become clear.* The carbonic acid gas thereupon generated is retained by the beer, whereby the latter becomes heavily charged with the former, and in tapping produces a fine, thick, white foam."

His fermentations are all described as open fermentations, and the settling and clarifying of the beer was by the slow process which always ensues with open casks.

Rec., p. 133. An article by Prof. Ladislaus von Wagner, in the "Manual of Beer Brewing," Weimar, 1877, on "Hastening the After Fermentation and Clarifying" of beer, credits Leo Meller, of the Meller & Hofmann patent, with the production of the apparatus and process.

He says:

> "Leo Meller, a mechanic of Ludwigshafen-on-the-Rhine, has constructed what is called a bung apparatus, for the purpose of accelerating the clarifying of beer, and which apparatus is successfully employed in many breweries. By means of this apparatus beer, *as soon as racked from fermenting tubs into casks*, is put under pressure of carbonic gas. * * * * Beer treated in this manner is said to become ripe and bright in from eight to ten days, whereas ordinarily it takes two months. * * * *"

Rec. p. 134. In a work entitled "Treatise on Beer Brewing," Braunschweig, 1877, published by Dr. Carl Lintner, is an article on "The Treatment of Young Beer."

He refers in it to the fact that Schwartz, the publisher of the "American Beer Brewer," at New York, says that

> "In America * * * * the beer while in the shavings casks is generally mixed with "kraeusen" * * * * the beer which is so 'kraeused' while on shavings, will partly remove its turbid particles by steady ejection from the bung hole in consequence of the increased flow of the after fermentation and partly by deposit among the shavings."

The foregoing indicates that at that period this new

apparatus and process was not known in the United States.

The article then proceeds to credit Leo Meller, of Meller & Hofmann, with this invention, and says,

> "As bearing upon the quicker clarification of beer I mean to mention at this place still another apparatus, which has been invented by a mechanic, Leo Meller, in Ludwigshafen-on-the-Rhine, and which has been introduced into various breweries with success. By this so-called bunging apparatus the beer, *as soon as it has been drawn off from the fermenting tubs into casks*, is immediately put under pressure of pure carbonic acid gas, and thereby, in the course of eight or ten days, it becomes ripe and bright."

Rec. p. 136-140. The American Beer Brewer, published by A. Schwartz, at New York, June, 1878, in an article, "Bunging by Means of Carbonic Acid Gas," describes for the first time this invention as a novelty. The author saw the apparatus at the brewery of Mr. Hofmann, of Meller & Hofmann, at Manheim, Germany. In the following paragraph he marks distinctly the new process introduced by Meller & Hofman:

> "We 'kraeuse' our beers while in the shavings casks, not only in order to increase the ingredient of extract, to infuse more life (effervescence) into the beer, but also in order to quicken the clarifying process by the overflowing of the 'kraeusen.' Inasmuch as the beers to which this bunging apparatus (the Meller & Hofman) is applied, do not overflow after the 'kraeusen' is added, it is questionable if all kinds of beer will become bright, even if the bunging is done as usual, with fining material. On the other hand I do not deny that a less amount of kraeusen will be required to accomplish the purpose of permanently securing the effervescence by means of the pressure of carbonic acid gas."

Rec. p. 141. In another issue of The American Beer Brewer, of June, 1879, the editor, Schwartz, referring to the bunging apparatus of the present, mentions this Meller & Hofmann invention, and after some general discussion adds,

> "*The great advantages of the apparatus can no longer be denied.* It is a safe protection for the casks; it facilitates maintaining cleanliness in the vaults; it enhances the absorbing capacity of the beer for carbonic acid gas by means of hydrostatic pressure."

It was new even to the defendants; Frank A. Maus, one of the defendants, was brewing for a number of years previous to the commencement of this suit, 1882.

He says,

> **P. 59, q. 6.** How soon after the beer is drawn into the shavings casks and the kraeusen and finings put in do you apply this apparatus, and how long do you keep it on the casks for the purpose of controlling the pressure of the carbonic acid gas.
>
> A. *As soon as the krausen and finings are added to the ruh beer in the shavings casks we attach the apparatus.* Sometimes, however, it is not attached until a day or two after they are added, and we keep it attached from eight to twenty days, till the beer is drawn off for the market.
>
> Q. 9. Before bunging apparatuses came into use for the purpose mentioned in complainant's patent, was it not a common and troublesome experience that the pressure of the gas would cause the foam and yeast, and also considerable beer, to overflow through the bung-hole, and thus to render the cellars foul and impure?
>
> A. Where no apparatus was used the foam and yeast escaped through the bung hole.
>
> Q: 11. The apparatus used in your brewery accelerates the clarifying of the beer, does it not?
>
> A. Yes sir; it does accelerate it somewhat.

Mathias A. Maus, another defendant, says:

P. 69, q. 1. At what pressure do you usually treat the beer while in the shavings casks?

A. From eight to ten pounds pressure. The gas cannot escape till it reaches that pressure.

Q. 3. When did you put in the apparatus now in use?

A. In the beginning of 1881.

Q. 6. Before 1877, or about that time, was any "bunging apparatus" or apparatus for automatically controlling the pressure of carbonic acid gas generated in shavings casks in actual use among brewers in this country, so far as you know?

A. Of my own knowledge I know of none.

Q. 7. Is it not a fact that since that time this process of treating beer by automatically controlling the pressure of carbonic acid gas in shavings casks has come into very general and extensive use among brewers; or, at least do you not so understand the fact?

A. Personally I have seen but one outside of ours. I understand that to be the case—*that it has come into more general use.*

Q. 8. *In your opinion as a practical brewer, is it not a very important and valuable process in the manufacture of beer?*

A. *It is.*

Clement A. Maus, another defendant, engaged for eighteen years prior to 1882 in brewing beer, says, that at Nashville, Tenn., he connected a cask with a pipe leading the gas into a water column.

C. A. Maus, q. 4, p. 41.

They did the same thing with separate casks at Indianapolis.

C. A. Maus, q. 13, p. 72.
Mathias A. Maus, q. 4, p. 66.

But the first time he ever used it all was at Nashville, in the the latter part of September, 1877.

C. A. Maus, q. 1, 2, p. 73.

But he never put in the present apparatus in dispute till 1881.

Speaking of the use of his own apparatus, he says:

> Q. 20, p. 73. What was the practical effect in regulating automatically the pressure in the beer casks of the apparatus devised and used by you in Nashville in September, 1877.
>
> A. In the first place *the beer could be bunged as soon as the "kraeusen" was added.* It regulated the pressure automatically. It worked well. It dispenses with filling up the cask every morning. I used it until I ceased brewing in Nashville."

The apparatus and its use from the time "kraeusen" was added in the shavings casks was new to the experts in this line.

Frederick M. Ruschhaupt, an acknowledged expert in this line of brewing, says in answer to an inquiry, that references to the same name in publications on the art of brewing, in Lintner and Von Wagner and different polytechnical journals, are intended for himself, and that he has written many articles on the subject.

Ruschhaupt, q. 8, 9., p. 125.

Referring to the complainant's patented process and apparatus, he says that the "kraeusen" stage in the shavings casks is that stage which begins with the introduction of "kraeusen."

Ruschhaupt, q. 32, p. 146.

That the treatment of beer in the shavings casks by the addition of "kraeusen" is a comparatively new thing, used but very little in Europe and for about fifteen years past in the United States. The usual process was to add "kraeusen" and permit the impurities to work out of the open bung by fermentation, and after fermentation has subsided the beer was fined, and then bunged in the usual way.

Ruschhaupt, q. 52, p. 149.

He then says:

P. 149. Q. 53. Do you know the Meller & Hofmann patent, No. 215,679, and when did you first become familiar with their invention?

A. I do. I first heard of their invention about the spring of 1877, when their European patents were spoken of. Shortly afterwards Mr. Bartholmae introduced their invention into this country, and since 1878 it became generally known more and more, as all the brewing papers in the United States described it and commented upon it.

He is asked then:

Q. 55, p. 150. Did that patent introduce or make known to the public any particular new feature aside from its mechanism or apparatus; if so, in what respect?

A. It indeed introduced a new feature. I will explain: It is an acknowledged fact that the influence of pressure upon a compressible object suspended in a liquid causes it to sink, and also that pressure in closed vessels is propagated to all sides with the same force. For this reason an ascending or rising of the insoluble impurities cannot take place as long as the pressure continues or increases; however, as soon as the pressure is released or diminished a rising must necessarily result. With beer, especially, such rising easily occurs, and the lighter impurities will almost at once be drawn into the beer again. Any apparatus which does not allow the pressure to become diminished at any time

during the operation and which is not apt to get out of order or become clogged, like a hydrostatic column, will avoid the drawbacks above referred to, and this object is beyond question fully accomplished by the apparatus patented to Meller and Hofmann. It is not simply a safety-valve or vent, but intended to accomplish much more, and to be used, if necessary, in the height of the kraeusen stage. *But not in this respect lies the principal advantages of said patent. Its new mode of treatment is the main thing. The patent recommends automatic bunging at an earlier stage of manufacture than before practiced, viz., during the kraeusen stage, and for an entirely different purpose, viz., to hasten the clarifying and settling of the beer.* The patent suggests in this respect a new and different mode of treatment before the beer is clear and settled. The new process is carried into effect by causing the liquid in the cask to be placed under an even and equal pressure of carbonic acid gas, which is uniformly applied and maintained throughout the treatment, up to the very time of racking off the beer, by means of an automatically working valve or weight, regulated at a prefixed standard of about seven pounds to the square inch.

The patent also recommends connecting a number or series of casks with each other, so that the gas may communicate from one cask to the other, and the fermentation be conducted under an entirely uniform and even pressure in all of them alike; the surplus gas from one keg will supply what may be wanting in others, and in consequence the settling and clarifying process in all of them will be more rapid, and in the end the effervescing character of the beverage will prove to be adequately even. By such connection of the casks at an early time of the kraeusen stage it may also be that the fermentation becomes more uniform; but I have not given the subject full examination.

Q. 59. Do you mean to say that the kraeusen and finings must be added at the same time in order to come within the patent?

A. Not at all; it is immaterial. *The main feature of the patent is the early bunging before the beer is clear and settled.*

Q. 60. Had any such process of early bunging, or

process of connecting the casks with a view of a more uniform treatment, been used prior to said invention of Meller & Hofmann, or known to the art?

A. *Not to my knowledge or belief. I have examined the books and publications bearing upon this question with considerable care, both in Europe and here, and I have not been able to find anything which detracts from the credit of such inventions prior to the year 1876 or thereabouts.* All publications deal with the subject of bunging as having no other or different object than withholding the required amount of carbonic acid gas and charging the beer with carbonic acid to give it life and effervescence; and *Profs. Lintner and Wagner, in their publications of 1877 and 1878, first speak of Meller as the inventor of this important process.*

Q. 61. You consider, then, if I understand you, the processes suggested by Meller and Hofmann a decided progress?

A. *They were a great progress, and presented many new features, as stated before.*

So also, Prof. Walter S. Haines, of the Bush Medical College, Chicago, holding the chair of chemistry in that institution and an acknowledged expert in this line, defines the old process and shows clearly the marked step made by Meller & Hofmann. He says.

P. 179, q. 38. Now, will you please to contrast in what manner the clarification of beer and its preparation for the market was accomplished by the trade before, and again, in what particular manner this patent of Meller and Hofmann's deals with the subject?

A. Under the old system the beer was clarified, first, by overflowage—that is a portion of the yeast cells and other sediment was by the upward pressure of carbonic acid gas in the casks driven out of the barrel through the bung-hole; second, as the fermentation began to subside and a great excess of the carbonic acid gas was no longer given off, the impurities had a chance to settle to the bottom of the cask among the shavings by reason of their gravity. This, however, was a slow process, owing to the fact that these particles are not very heavy; moreover, the

upward rising bubbles of carbonic acid, even though not great in number, would have a tendency to disturb the purity of the beer. Third, finings were added at the close of the active fermentation, which mechanically would entangle the solid particles of the beer, and then by gravity cause them to settle. The same disadvantage, however, applied here as in the second case, for the carbonic acid gas bubbles would have a tendency to buoy it up, and hence keep it from promptly settling. Such was chiefly the old method of clarifying beer. *The Meller & Hofmann system, however, revolutionizes this matter*, for by excluding air from the casks it, in the first place, prevents an undue formation of yeast cells and other solids, and so diminishes the amount of impurities present. It has been demonstrated that fermentation which takes place away from contact with the oxygen of the air is prone to generate fewer yeast cells, and so contaminate the liquid less with them than the fermentation which goes on in contact with the air. *This is an important advauage gained by the Meller & Hofmann system.* In the second place, not only does this new system prevent the formation of sediment, but it also hastens the subsidence of the impurities present. It acts, in accomplishing this, in this way: pressure being exerted upon the liquid, so much carbonic acid gas does not at first arise, but is held in solution in the beer until the pressure is equalized; consequently there is not at first so much mechanical agitation of the beer by the evolution of gas. But a more important action now sets in; the increased pressure causes the particles of yeast and other impurities to become denser and of a higher specific gravity, and so forces them more rapidly to subside. The Meller & Hofmann process, therefore, not only produces less sediment, but by increasing its density obliges it to settle more rapidly. There is, indeed, still another advantage more or less connected with the clarification of the beer when that process is used. It is found that under pressure the yeast cells do not occasion so rapid a fermentation as they do when no pressure is applied. Hence when using the Meller & Hofmann process pressure being exerted upon the

fermenting fluid, less fermentation goes on; consequently fewer bubbles of carbonic acid gas are generated or arise from the fluid and escape. From this cause there is less disturbance of the fluid by mechanical agitation of the uprising gas, and the particles, therefore, held in suspension have a better chance to deposit."

He then defines very concisely the feature which constitutes the essential element of the process.

P. 185, q. 63. Now, when you say that the use of a water column, or a column of other liquids as a means of pressure or confining gases, is old; that the use of kraeusen material and finings for the purpose of clarifying is comparatively old, and that bunging, using tight bungs or automatically working relief bungs and air-pumps are old, what is there, then, novel or characteristic in the Meller & Hoffmann patent entitling it to the consideration that you claim for the same?

A. The novelty and characteristic feature of the process, by which its excellent results are produced, chiefly arises *from its introducing an automatically acting process at an earlier stage of the preparation of beer than has been practised by other devices. This earlier bunging produces a number of valuable results, one of the most valuable of which is the rapid clarification of the beer.* By placing the actively fermenting liquid under adequate, automatically controlled pressure, and keeping it thus under pressure until drawn off for use, the beer ferments more equably, less sediment is produced, and clarification is more rapid and certain. *It is then, as I understand it, not the mechanical application of pressure, but the application of a suitable pressure, beginning with the second active fermentation of the beer, and continuing to the close, that constitutes the most valuable and novel feature of this process.*

The novelty and value of the process are also well set forth in the testimony of Wm. J. Seib, the foreman of the great Conrad Seipp Brewery Company of Chicago. After stating that their brewery is the largest in Chicago, and

manufactures more than one hundred and sixty thousand barrels per year, he is asked:

Wm. J. Seib, p. 170.

"Q. 7. What is there particularly new or novel in the Meller & Hoffmann method of treating beer over the old mode of treatment?

A. The main thing is that you put in the kraeusen and fining and then bung immediately.

Q. 8. How was the beer treated while in shavings casks, before the Meller & Hoffmann invention became known?

A. We put in the kraeusen and then let the beer work out from the bung hole. Every second day we had to fill up the casks—sometimes every three days; I did it every two days. In this way we treated the beer until it did not any longer work, and was comparatively fine (clear); then we put in the finings. Then, after three or four days more, the beer proved to be bright or brilliant, and then the beer was bunged to charge it with carbonic acid, and then it was racked off into the tapping kegs.

Q. 9. Had you ever known or heard of beer in the kraeusen stage, in shavings casks, being bunged before the active fermentation was over and the beer clear until this method was suggested by Meller & Hoffmann?

A. No, sir."

THIS EARLIER BUNGING MARKED A GREAT EPOCH IN THE MANUFACTURE OF KRAEUSED BEER. THE VALUE OF THE INVENTION WAS UNIVERSALLY CONCEDED AND RECOGNIZED, AND PROMINENT BREWERS EVERYWHERE OBTAINED LICENSES UNDER IT.

The defendants concede it.

Mathias A. Maus, p. 69.

Q. 7. Is it not a fact that since that time this process of treating beer by automatically controlling the

pressure of carbonic acid gas in shavings casks, has come into very general and extensive use among brewers: or, at least, do you not so understand the fact?

A. Personally, I have seen but one outside of ours. I understand that to be the case—that it has come into more general use.

Ruschhaupt, p. 151.

Q. 61. You consider, then, if I understand you, the processes suggested by Mellar and Hofmann a decided progress?

A. They were a great progress, and presented many new features, as stated before.

It had, prior to 1882, when the testimony was taken, been introduced by the complainant almost universally in the United States.

Otto Zweitusch, p. 37.

Q. 11. Has the process of treating beer under automatically controllable pressure of carbonic acid gas, as described in the Meller and Hofmann patent, come into general use or not, and is it of any considerable value or importance in the brewing business?

A. It is of great value in the brewing business, and has come into general use; it has been put up by the company and the prior owner of the patent in almost eighty breweries, many of which are among the largest in the United States.

The largest breweries employ it; as, for instance, the Conrad Seipp Brewery, in Chicago, the most extensive in the city, producing more than one hundred and sixty thousand barrels per year, as testified to by the foreman.

Wm. J. Seipp, p. 170.

Q. 6. Do you use the Meller and Hofmann apparatus and process all through your brewery, on the shavings casks, or only on some of them?

A. We use it all through our brewery on shavings casks, except in a new cellar of the fermenting room, which we applied for that purpose of late.

ANALYSIS OF THE DEFENSE.

We find at first the usual air of injured innocence, and that the whole alleged invention was of no earthly value. Then, secondly, there is the assumption that there was no infringement, because they had used the same thing at Nashville, Tenn.

The complainant replies to the first point by producing the evidence furnished by prior and contemporaneous publications in this country and Europe. Also the testimony of experts of national reputation in this art.

Complainant produces further the fact of the great revolution it worked in the manufacture of "kraeused" beer, and that prior to 1882 more than eighty of the most prominent brewers in the United States were quick to adopt the invention and take licenses under the patent.

The complainant meets the second defense by showing, first, that the use by Maus, at Nashville, was on individual casks and not upon connected casks. Further, that it was first so used in the latter part of September, 1877, being a couple of years, at least, later than the French patent to Meller and Hofmann, and after the invention had been introduced into the United States, which was in the last part of July and first part of August, 1877.

The complainant further meets this second defense by the fact that the defendants did not introduce the connected system at Indianapolis until 1881; that they did not then rely upon what had been done by C. A. Maus at Nashville, but they allied themselves with the Wallace patent, organized the Wallace Company and assumed that their apparatus was erected in accordance therewith, whereas a glance at the patent demonstrates the utter dis-

similarity of the patent to the thing which they erected and the Meller and Hoffman patent.

The defendants next produced evidence of a variety of ventilating bungs and appliances adapted to hold a fermenting liquor under pressure and permit the gas to blow off when it shall have reached a certain limit.

But the state of the art in this respect is wholly admitted by the complainant. They concede that it is not new to maintain a pressure on a fermenting liquid by a water column, or by a mercury column, or by a weighted safety valve, or a ventilating bung, but in none of these instances of alleged anticipating devices is there disclosed in connection therewith, that they were ever used upon, or that it was ever conceived that they might be used upon, beer during the kraeusen stage of fermentation. In other words, they took the art of fermentation as it was, and these appliances were all simply designed to take the place of bungs where bungs had been employed in the usual process of fomentation. The purpose was to save the cask from bursting or to relieve the brewer or distiller of the necessity of so great watchfulness in order to prevent overpressure. Not one of them ever conceived the idea of changing the process of the manufacture of the beer; not one of them aimed to hasten the production of the beer. But Meller and Hofmann sought to improve the process itself; they altered materially the usual course and treatment of the beer; they applied pressure at a stage in the process where before the beer had always been open and free from pressure and accomplished thereby decidedly different chemical and mechanical actions in the liquid from what had ever before been accomplished.

So also, Meller & Hofmann devised apparatus adapted to connect a series of shavings casks in a cellar with a

common conduit having a pressure regulating escape orifice, whereby the whole series was held under equal pressure and free circulation of gas maintained from cask to cask without in any way agitating or disturbing the liquid.

The only attempt to prove an anticipation of this apparatus is,

FIRST: By the Wallace patent in which gas escaping from one cask was obliged to pass through a perforated pipe immersed in the liquid of the adjacent cask, thereby producing an agitation which would be utterly ruinous in the manufacture of beer demanding perfect quiet.

SECOND: By what is known as the Sturm Device, (Record p. 76) wherein three casks were connected with a wash barrel, located higher than the casks and a pipe dipped therein only two or three inches; the cask had a ventilating bung or mercury column sufficient to resist about one pound of pressure. But Mr. Sturm is the only witness relative thereto; he does not seem to know what kind of casks they were connected with, or whether the beer was in one stage or another.

Several things are here apparent:

FIRST: If the casks were filled so that foam and beer would by fermentation flow into the wash-barrel, there would be a liquid connection between the three casks, and could, of course, not be used for clarifying beer in different stages of completion.

SECOND: The slight pressure of one pound would be practically equivalent to no pressure; would not hold back the rising gas nor contract the yeast cells; hence could not accomplish the process, even had such an idea ever been contemplated.

THIRD: Should at any time the fermentation subside in the casks, there would remain a space in each cask, and there would immediately result a draining of the water down by siphonage from the wash-barrel, into the casks.

And finally, should fermentation subside in the end casks, before it had subsided in the central casks, foam and liquid would pass off from the central cask into the two side casks, and thus set up a new fermentation. In fine, no one knows what the Sturm device was used for, or at what stage it was used, and the conditions are such that it would be wholely useless for the purpose of carrying out the process of complainant's patent or for any other use in the kraeusen stage, or the settling or clarifying stage in the manufacture of kraeused beer. In fact there is not the slightest evidence that the brewery where it was placed ever made kraeused beer, and the period of its alleged experimental use was before the manufacture of kraeused beer was ever begun in the United States.

THE LAW OF THE CASE.

It appears from the opinion of the court below that it failed to grasp the distinction between the application of pressure in the kraeusen stage and the application of pressure after the kraeusen stage.

The Court is correct in saying that means had been employed to regulate the pressure upon beer and other liquids, for it has been common for a long period after the kraeusen stage; that is to say after the kraeusen fermentation has subsided and the beer become clear, to bung it with a regulating bung which should hold back the last developed carbonic acid gas, so as to enliven the beer and not permit it to become overbunged. Such use,

however, transpired after the period in which the patent contemplates its use, and, since the use of such apparatus was begun after the beer had become settled and clarified, it could not operate to hasten and facilitate clarification—the thing which is accomplished by the Meller & Hofmann process.

Again, it seems a very harsh construction of the Meller & Hofmann patent to assume that the claims are, in effect, for a result. The specification is very specific and defines and illustrates, with particularity, mechanism adapted to carry out the process. Of course, this process in its broadest sense consists in the addition to the former process in vogue of a new step, *i. e.*, the application of pressure to the beer as soon as kraeusen has been added to the ruh beer in the shavings casks. Means are shown for accomplishing the pressure, but it would seem an unwarantable restriction, when a variety of devices might be employed for producing precisely the same pressure, to limit the protection afforded by the patent solely to the one apparatus illustrated in the patent. It would seem but reasonable to hold that any apparatus which would confine the pressure upon the beer at this stage would, in the consideration of the process, be regarded as equivalent mechanism, and so instead of construing the patent to be for a result, produced by any means, it should in this respect be construed to be a process for producing a result by the means described in the patent, or by other equivalent means.

Each claim of the patent refers clearly to the specification for a description of the means to carry out the process claimed, and to separate the means from the process does violence to the language of the claim in each case.

It would seem therefore that the court is not justified in assuming that the claims are made irrespective of any mechanism for carrying them out, even should it appear that any other mechanism might be the equivalent, in the process, of the means described.

The following decisions seem to be to the point:

"Patents for inventions are treated as a just reward to ingenious men and as highly beneficial to the public, not only by holding out suitable encouragement to genius and talent and enterprise, but as ultimately securing to the whole community great advantages from the free communication of secrets and processes, and machinery, which may be most important to all the great interests of society, to agriculture, to commerce, and to manufacturers, as well as to the cause of science and art. Specifications are therefore clearly entitled to a liberal construction, since they are granted not as restrictions upon the rights of the community, but 'to promote science and useful arts.'"

Blanchard vs. Sprague, 2 Story, 164.
Seymour vs. Osborne, 11 Wall, 516.

"When a person has invented some mode of carrying into effect a law of natural science or a rule of practice, he is entitled to protect himself from all other modes of making the same application. The substantial identity, therefore, that is to be looked to respects that which constitutes the essence of the invention, viz., the application of the principle. If the mode of carrying the same principle into effect adopted by the defendant still shows that the principle admits of the same application in a variety of forms or by a variety of apparatus, such mode is a piracy of the invention."

Wintermute vs. Redington, 1 Fish. 239.
Tilghman vs. Werk, 2 Fish, 229.

"It would seem that where a patent is obtained without a claim to the invention of the machinery

through which a valuable result is produced, a precise specification is required, and the test of infringement is whether the defendant has used substantially the same process to produce the same result."

Leroy vs. Tathan, 14 Howard, 156.

"It is essential to the validity of a patent for a process, to show how it may be adapted to practical use. In showing this the inventor may describe mechanical means of applying, or peculiarly shaped vessels for containing, any of the ingredients used in his process or art. But they constitute no part of his invention. Another person may discover new and useful means of applying or using the inventor's process, and be entitled to a patent for that improvement without the right to use the process."

Piper vs. Brown, 4 Fish, 175.

"The machinery pointed out as suitable to perform a process may or may not be new or patentable, while the process itself may be altogether new, and produce an entirely new result. The process may be patentable irrespective of the particular form of the instrumentalities used."

Cochrane vs. Deener, 11 O. G., 637.

"The elements of the process may be old, but when combined for the purpose of putting a new idea to practical use, they constitute a new and useful process."

Andrews vs. Carman, 13 Blatch., 307.
Brown vs. Piper, 91 U. S., 37.

"The patentee having described his invention and shown its principles, and claimed it in that form which most perfectly embodies it, is, in contemplation of law, deemed to claim every form in which

the invention may be copied, unless he manifests an intention to disclaim some of these forms."

Union Paper Bag Co. vs. Pultz & Walkley Co., 15 Blatch., 160.

SUMMARY.

It must be conceded that the Meller & Hoffmann invention marked a turning point in the manufacture of kraeused beer throughout the United States, and in fact throughout the world. Vent bungs, water columns, mercury columns, safety valves and other apparatus had been employed and worked no revolution in the art; had effected no change in the *modus operandi* of making kraeused beer. As soon, however, as the Meller & Hoffmann invention was promulgated, the whole brewing fraternity was visibly affected. We find that within four or five years the Meller & Hoffmann apparatus had been introduced, not only abroad, but into some eighty of the principal breweries in the United States. It was sought and accepted with avidity.

The courts have many times held that utility is evidence of invention, and certainly that thing which created so much interest in brewing circles must have possessed both novelty and utility to the brewing trade.

What, then, was this novel and useful thing? It was not the apparatus, for that is simple enough, and simulates other apparatus long in use for creating pressures.

It was not merely the connection of a series of casks, for while the means were doubtless novel, the general idea of merely connecting several vessels in this and other

arts was old. Where, then, was the germ of this invention which worked this great revolution? The answer is plain. It was the announcement promulgated by Meller & Hofmann of a new step or procedure in the art of brewing beer, and especially the art of manufacturing kraeused beer.

This new step consisted essentially in applying pressure to the beer at a stage where pressure had never before been applied. Pressure had been applied to the beer at a later stage, in fact, no brewer could make a marketable article without in some way bunging and confining a pressure upon his beer to enliven it before drawing into kegs. It was not, however, the simple idea of applying pressure to the beer in any stage that worked this revolution, but the applying of pressure at the time kraeusen was added to the ruh beer in the shavings casks, this being a period earlier than that at which pressure had ever before been applied; a period where, prior to that time, all brewers, the world over, had maintained an open bung and permitted froth, impurities and beer to work out therefrom. Does this merit no protection? Is it not just such an improvement in the art as is contemplated by the direct language of the statute?

If entitled to protection it can only be secured by a process patent. If the specification is clear and defines how the process may be carried into effect and describes the mechanism for operating the process, so that there remains no ambiguity as to the scope of the claim, the language of the latter would seem to be of little consequence. One person might frame it in a certain way, another person might use different language in shaping the claim, but the claims in this patent, as far at least, as we are able to discover, seem to be framed with great care and

definiteness. They each carefully exclude all stages of the process which are not altered and are confined closely to the particular change or step introduced by the patentees.

We trust that the patent may be sustained and a decree ordered in favor of the complainant, the appellant.

Respectfully submitted,

WELLS W. LEGGETT,

Of Counsel for Appellant.

Filed
May 10/87
122-413

SUPREME COURT

OF THE

UNITED STATES.

THE NEW PROCESS FERMENTATION COMPANY,
vs.
MAGDALENA MAUS AND OTHERS.
No. 298.

ARGUMENT FOR APPELLEES.

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IRENE R. SMITH, PRINT., INDIANAPOLIS.

SUPREME COURT

OF THE

UNITED STATES.

THE NEW PROCESS FERMENTATION COMPANY,

vs.

MAGDALENA MAUS AND OTHERS.

Appeal from the Circuit Court of the United States for the District of Indiana.

This suit was brought by the appellant, the New Process Fermentation Company, against the defendants for infringement of Letters Patent, No. 215,679, issued to Leonard Meller and Edmund Hofmann, May 20, 1879, for an Improvement in the Process of Making Beer.

The specification of the Patent is found in the Record, beginning on page six (6).

Meller and Hofmann's Specification.

The previous state of the art in making beer is thus described, viz:

"Heretofore, in brewing beer, after cooking and cooling, the beer has been put into open vessels to ferment. The fermentation lasts, say, fifteen days, and then the beer is drawn off from the yeast into large casks nearly closed, where it remains from one to six months to settle, and among the sediment there will still remain some yeast. The beer is then pumped into shavings-casks, and is mixed with young beer, (kraeusen), which starts a mild fermentation, lasting from ten to fifteen days, until the generation of the gas is reduced to a minimum. During this fermentation the beer effervesces through means of the carbonic-acid gas rising, and the lighter particles of yeast and solid matter are thrown to the top, forming a foam, which, during the ebullition, runs over the edges of the opening in the cask, and carrying along a small portion (more or less) of the beer, which is wasted, and this waste has to be replaced by refilling with new beer daily. This wastage we estimate, from practical experience in the manufacture, to be about one barrel in every forty, more or less. This waste beer, running down around the casks and on the floor of the cellar, sours and produces a mildew, which impregnates the air with foul vapors, highly injurious to the workmen, and, permeating the beer in the casks, alters its flavor, and, in instances where the mildew penetrates the wood of the casks, spoils the beer entirely. This fouling of the barrels requires that they should be washed outside, from time to time, and the water used in this washing always raises the temperature of the cellar, and wastes the ice which is therein packed to keep the temperature about 41° Fahrenheit. After the beer

has been in the shavings-cask from ten to fifteen days, the gelatine or other clarifying medium is introduced, and at the end of a couple of days the beer is entirely clear. The shavings-cask is then bunged up tightly for from three to five days, to confine the last portions of the rising carbonic-acid gas. This charges the beer with carbonic-acid gas (CO_2), so as to make it merchantable, and it must be drawn off at once into kegs and used; otherwise the pressure on the shavings-cask may burst it.

"In selecting the time for drawing off the beer from the shavings-casks into the kegs to send it to market, the beer should never be under a pressure of over seven pounds to the square inch; otherwise the keg fills with foam in the drawing off, and the bubbles subsiding leaves an air-space over the liquid beer, which absorbs a portion of the carbonic-acid gas, and soon leaves the beer in the keg flat. As the art is now practiced, arriving at the proper degree of pressure when to put the beer in kegs is merely a matter of judgment or guess by the foreman, and no two shavings-casks will be drawn off at precisely the same pressure, and the effervescing qualities of the beer will vary considerable, much to the detriment of sales by the brewer. If the beer is not put in market at once at this stage, the bungs have to be removed from the casks and the gas allowed to escape. Then the escaping gas stirs up the yeast and impurities that have settled to the bottom, and the beer has to go again through the entire shavings-cask step in the process.

"Under the processes now in use it requires about

twenty days to put beer on the market after it is pumped into the shavings-casks. This delay requires brewers to keep a large amount of capital invested during the time in unfinished beer, and it is highly important to decrease this time of preparation."

The invention is thus defined:

"Our invention consists in treating the beer when in the shavings-cask step of the process in one or more closed casks under automatically-controlled carbonic-acid-gas pressure, generated either by the mild fermentation of the beer or artificially. This equalizes the pressure in such cask or series of casks, and the effervescing quality of the beer in all the casks when two or more or connected together is uniform.

"*The cask or casks being closed*, none of the beer wastes by running over, and the foul smells and washing of the casks and cellars are avoided. The escaping carbonic-acid is *conducted from the relief-valve to the open air*, and does not settle in the brewing-cellars to endanger life.

"Our invention consists, further, in similarly treating the beer when in the 'kraeusen' stage, or subsequently thereto, or both; or when the settling-casks, ('ruh-beer,') this being the second fermenting stage—that is to say, our invention consists in so treating the beer at any time or times previous to racking off or bunging or bottling."

And after describing the apparatus in detail the inventors state:

"Our process enables the brewer to keep on hand merchantable beer, which can be shipped instantly, or,

if trade decreases, it enables him to keep his stock on hand without deterioration till the demand is made for it.

"*All that has been said above in relation to a series of casks applies, of course, equally to treatment in a single cask.*

"It is obvious that means other than a water-column may be adopted for equalizing the pressure of the gas without departing from the spirit of our invention—as, for example, safety-valves and the like—*and the apparatus is susceptible of many other variations without affecting the process itself, which constitutes the essence of our invention :*"

It is further stated, however, in the specification :

"The essential features of our invention have been patented in foreign countries as follows: France, to Leo. Meller & Co., filed September 28, 1876; allowed and countersigned Paris, November 30, 1876, No. 114,-737. Belgium, to Leo. Meller & Co., filed February 14, 1877; allowed and countersigned Bruxelles, February 28, 1877, No. 41,517."

Meller and Hofmann's Claims.

The claims of the patent are these :

"1. The process of preparing beer for the market, which consists in holding it under controllable pressure of carbonic-acid gas when in the 'kraeusen' stage, substantially as set forth.

"2. The process of treating beer when in the kraeusen stage, which consists in holding it in a vessel under automatically controllable pressure of carbonic-acid gas, substantially as described.

"3. The process of preparing and preserving beer for the market, which consists in holding it under controllable pressure of carbonic-acid gas from the beginning of the kraeusen stage until such time as it is transferred to kegs and bunged, substantially as described."

"4. The method herein described of preserving beer in a marketable condition after it has passed the kraeusen stage, which consists in holding it under pressure of carbonic-acid gas, said pressure being automatically regulated by a counteracting hydrostatic pressure, substantially as described.

"5. The process of treating beer when in the second fermenting stage, ('ruh-beer,') which consists in holding it under automatically-controllable pressure of carbonic-acid gas, substantially as described.

"6. The process of treating beer in the course of its manufacture, which consists in holding it in closed connected vessels under automatically-controlled pressure of carbonic-acid gas, substantially as described.

"7. The process of clarifying and settling beer in a series of shavings-casks, and equalizing the rate of fermentation in all of them, whereby the beer is more rapidly and thoroughly clarified, and will be ready for racking off in all the casks at the same time, and can be kept so, which consists in holding the beer in closed connected shavings casks under automatically-controlled low pressure of carbonic-acid gas, substantially as described.

"8. Casks A A, provided with cocks *a a*, flexible sections *k*, and taps N N, in connection with main pipe a^1, water-column C, pressure-gauge *e*, all constructed,

arranged, and operated as and for the purposes set forth."

THE STATE OF THE ART.

Before proceeding to discuss the validity of the claims, or the question of infringement, it will be proper to consider the question of the state of the art.

And here it may be said, that either through ignorance, or upon deliberate purpose, the writer of the specification did not, and has not, truthfully stated the facts as to the methods of treating beer under fermentation, which were not only well-known, but were matters of public record in the United States Patent Office, long before Meller and Hofmann filed their application for Letters Patent.

The Wallace Patent.

Thus, Letters Patent No. 62,581, issued to George Wallace, March 5, 1867, show an apparatus for Fermenting Malt and other Liquors, in which a pair of closed fermenting vats, A and B, have pipes which connect the two vats with each other, and with a tank C, which contains water, and as the inventor says, "in the middle of pipes E and F are two-way cocks H, designed to relieve the vats or tanks A and B of *surplus pressure of gases* by allowing them to escape through pipes G, into the vat or tub C, containing water, yet retaining any alcoholic gases that may arise; also, *to insure an equal fermentation in each vat or tank.*"

And this result is accomplished, says the inventor, further on, by means of "two-way cocks, H, which insures the regulation of the pressure and gases during fermentation. *If one vat is fermenting faster than the*

other, the surplus gas is discharged in the other vat; or if each vat has a surplus gas, it is then turned off through pipes G, and allowed to escape in the water in vat or tub C, which prevents alcoholic condensation, and the atmosphere from getting into vats or tanks A and B."

See Record, pp. 83, 84.

And in his third claim Wallace distinctly claims the use of a water-column in connection with closed fermenting tanks or vats.

This patent is set up in the answer not merely as illustrative of the state of the art, but as actually anticipating the process claims of Meller and Hofmann, and Judge Drummond, in his opinion, held that it was a good defense to those claims. But just now it is referred to in proof of the statement that the specification of Meller & Hofmann contained "much less than the truth," as to the state of the art of fermentation.

But it may be argued, Wallace's apparatus was for making whisky and not beer, and is, therefore, not directly in point. To this it might be answered: First, that he describes it as an "Improvement in Apparatus for Fermenting *Malt* (Liquor) and other Liquors."

This clearly shows that he contemplated its use for making Malt Liquors and other Liquors, but whether he did or not it is a well-settled rule of law that

—"It is no new invention to use an old machine for a new purpose. The inventor of a machine is entitled to the benefit of all the uses to which it can be put, no matter whether he had conceived the idea of the use or not."

Roberts v. *Ryer*, 91 U. S. 150.
S. C., 10 Off. Gaz. 204.

The case cited was a suit on a refrigerator patent, issued to one Sandford. The answer set up was anticipation by a device of Lyman; and in discussing this question the Court (Chief Justice Waite) said, among other things, that Sandford's device was "a mere carrying forward a new or mere extended application of the original thought; a change only in form, proportions, or degree, being substantially the same thing, in the same way, by substantially the same means, with better results. This is not such an invention as will sustain a patent."

Citing: *Smith* v. *Nichols*, 21 Wall. 112.

So that, following this reasoning, it may be conceded that Wallace's device was crude, and objectionable, perhaps, in mechanical construction, and that Meller and Hofmann's apparatus, being superior in construction, produced better results, and yet the appellant has not made out a case, or shown any invention which could sustain the Meller and Hofmann patent either for a process or apparatus.

The Hicks Patent.

Again, the answer sets up the Letters Patent issued to Thomas R. Hicks, April 9, 1867, No. 63,636, for an Improved Vent Plug. This patent is found in the Record, pp. 84, 86. The drawing is marked 89, and faces p. 86.

In his specification Hicks describes his device as designed "for vessels holding fermenting liquors, and to render them air tight, and the same time to prevent them from bursting; in other words, to provide a vent plug adapted to give relief under pressure," etc.

In fact, it was a sort of safety-valve bung, and the device was so arranged that it could be set at any desired pressure, and when the pressure from the carbonic acid gas inside the cask exceeded that of the spring e, upon the valve g, the gas would raise the valve and blow off until the conditions were reversed. It operated precisely like the safety-valve upon a steam engine.

The drawing shows only the construction of the valve and bung, and no cask or casks are figured, but it is clear that if Hicks showed how his safety-valve would operate on one cask, and Wallace showed how a water-column valve would regulate a series of casks, there was nothing left for an inventor to claim except some peculiar form of mechanism designed for a similar purpose.

In fact, Meller and Hofman distinctly say that

"Our invention consists in treating the beer when in the shavings-cask step of the process *in one or more closed casks* under automatically-controllable carbonic-acid-gas pressure, generated either by the mild fermentation of the beer or artificially." And again they declare that "all that has been said above in relation to a series of casks, *applies, of course, equally to treatment in a single cask.*"

It is evident, therefore, that both the Wallace & Hicks patent fully anticipate the Meller & Hofmann apparatus. And this is rendered more certain, so for as the Hicks patent is concerned, by the fact, shown in the record, that one Otto Zwietusch, the manager and secretary of the complainant corporation, (Record, p. 35), bought up the Hicks patent, took an assignment thereof

to himself, and applied for a re-issue thereof hoping to cover the entire field of invention in this line.

See Record pp. 116–123.

The claims he made in this application for a re-issue are very interesting in this connection. They are as follows, viz:

What I claim, therefore, and desire to secure by Letters Patent is;

1st. As a new article of manufacture, a spring-pressure Vent Plug, construed substantially as, and for the purpose, described.

2d. *The method herein described of giving beer a predetermined and continued pressure, while under process of fermentation, by an automatic relief-discharge of pressure from the cask substantially as specified.*

3d. *The method herein described of treating fermenting liquors, consisting in the application to a cask or casks, of a valve, constructed to open and give relief automatically by a predetermined pressure which is generated by the liquid contained in the cask substantially as specified.*

4th. A vent plug for casks having a predetermined discharged capacity, from which the relief discharge is caused by the self generated pressure formed in a cask by means of fermentation of the liquid contained therein.

5th. As a new article of manufacture, a safety-valve for casks, capable of having a predetermined and equal capacity for retaining and allowing gas to escape, substantially as specified.

6th. *A vent plug for fermenting casks (having an automatic relief discharge,) which is capable of being regu-*

lated to increase or diminish the pressure in the cask at will, substantially as and for the purpose set forth.

Notice the claims printed in italics. If valid and allowed, they would have at once and forever shut out the Meller & Hofmann apparatus, process and all, in this country at least.

The assignment from Hicks to Zwietusch was made November 7, 1878. The application was sworn to November 25, and soon after filed in the Patent Office. It was rejected by the examiner—the bung itself on prior patents, and the other claims as being new matter—and the application was abandoned on the 19th of August, 1879, by Zwietusch's attorneys, A. H. Evans & Co.

Now the Courts are familiar with the principle of "legislative construction,"—that is that a statute will construed by the Courts in harmony with a construction already given it by the law making power. Another and analogous rule is, that where parties to an instrument have construed it to mean a certain admissible thing, they will not afterwards be heard to insist that it meant something else.

Pollock's Principles of Contract, Am. Ed. 392.

Chicago v. *Selden*, 9 Wall., 50, 54.

Howe v. *Clarke*, 1 Met. 378.

If this rule be applied in the case at bar, the complainant, neither by her managers, nor any one else, can now fairly be heard to disavow the construction of the Hicks patent which such manager insisted, by his attorneys, was the true and correct one. The only loop hole of escape would be to insist that Zwietusch as manager

of the complainant corporation, was not to be bound by the acts of Zwietusch personally. But the additional fact that the business he was personally engaged in, was practically the same that he was employed as manager to further, will not allow of this contemptible evasion, were he disposed to avail himself of it.

In this case, furthermore, it will be seen that the second and third claims of the application for a re issue were for a process, or "the method" of treating fermented liquors described. The case was taken upon final appeal to the Commissioner of Patents, and his opinion is reported in *Ex parte* Hicks, 16 Off. Gaz. 546. The material portion of it is as follows, viz:

Commissioners' Opinion on the Hicks-Zwietusch Appeal.

"After setting forth the 'nature, construction, operation, and advantage' of the article, applicant now applies for the reissue of his patent, and leaving out all claims for the construction, claims the operation and advantages of the vent-plug as follows:

"The method of conducting the fermentation of liquids, which consists in subjecting the fermenting liquids in an air tight vessel to a predetermined automatically-maintained pressure of the gas generated in the fermentation, substantially for the purpose described."

It is only necessary to determine whether, in view of the description of the invention, as above given, applicant could originally have made the claim which he now seeks; for if such a claim could have been properly granted before the issue of his patent it can now be obtained by reissue.

It is true that a process is patentable, whether it is what is known as a mechanical process or a chemical process, which consists of steps or acts performed in a certain order, and which effect by their joint operation, a new and useful result; and in a mechanical process it matters not whether the means employed are new or old. An illustration of this doctrine is given in the case of *Cochrane et al.* v. *Deener et al* (11 Official Gazette, 687,) where the mechanical process consisted in passing ground meal through a series of bolting reels of progressively finer meshes, and, at the same time, subjecting the meal to blasts of currents of air, etc. *Where, however, the process is but the legitimate function of the machine, and the particular apparatus described is indispensable to the conduct of the process, the apparatus should be claimed, and not its functions or operation.* As, where a patentee, having claimed the arrangement of feeding-belts with the planes inclined, etc., in combination with a rotating brush and other specific machinery for forming hat-bodies, could not sustain his reissued patent in which was claimed the operations which were the results (and so stated in the claim) of the combination of the mechanism which formed the subject of his original patent, the Court *held that no inference could be drawn from the statute by which the inventor, by having made an improvement in a machine and thus effected a desired result in a better manner than before, could include all all other machines for accomplishing the same result.* (*Burr* v. *Duryee* 1 Wall., 531, Harrison, ex parte, 10 Official Gazette, 373.) Now, the present applicant set forth in his patent that he had provided a good and efficient vent-plug for

vessels for holding fermenting liquors, by which the same could be rendered air-tight and prevented from bursting while such fermentation was proceeding, and which was so formed as to be automatic in its operation to allow the escape of the gages. This was the necessary operation of the plug when used, and the limitation of the original application, when filed, to the article, would not have justified the Office thereafter in permitting its enlargement, or in now permitting the enlargement of the patent, to embrace a claim for a method of conducting the fermentation of liquors that would include all other means known and unknown for producing the same result.

The decision of the Board of Examiners-in-Chief is affirmed."

This decision is in entire harmony with the views of Judge Drummond, who decided the case in the Court below, and whose opinion will be found in the record pp. 25–31. But this question will be discussed more fully further on.

The Dietrichsen Patent.

Another patent set up in the answer is that of W. Dietrichsen, No. 90349, "issued May 25" 1869, for an Improvement in Apparatus for Preserving Beer. This is found in the record at pp. 86 and 87—the drawing facing the latter page. The device is intended to supply air to a cask of beer on draught, and to prevent the escape of carbonic acid gas, and thus prevent the beer from becoming "flat" and lifeless. The apparatus consists of two reservoirs, an upper one A, containing a body of water whose weight compresses air in the lower

reservoir A'. A tube leads from the air reservoir to a plug or spigot J, which is driven into the cask, and this plug contains a small check valve X which is kept shut by the pressure of the gas in the casks.

This device illustrates the use of a water column to maintain pressure upon liquor fermenting in a single air tight cask, and with slight mechanical changes involving only the exercise of scientific knowledge and ordinary skill, could be adopted to operate upon a series of casks.

The Gilham Patent.

The patent of William Gilham, for an Improvement in Processes and Apparatus for the Manufacture of Sparkling Wines, issued June 13, 1871, No. 115950, (Record pp. 88–91) would seem to draw the lines still closer, and fairly exclude every remaining element of invention from the Miller & Hoffman apparatus or process.

Gilham states the object of his invention thus:

Nature and Objects of the Invention.

"The object of my invention is to produce sparkling wine in bulk, or on a large scale, by causing the wine to become charged, under great pressure, with the carbonic-acid gas generated by itself during the process of fermentation, thus forming a natural sparkling wine similar to that which has hitherto only been produced on a small scale by bottling unfermented wine, and not a factitious article, such as may be produced by the injection therein of gas derived from other sources.

The first part of my invention relates to the process

above alluded to, the essential part of which consists in confining the wines in an incipient state of fermentation, and in large quantities, within strong and tight vessels, provided with proper tubes, or pipes and valves or cocks, until the wine shall have sufficiently fermented to become charged with gas under any proper degree of pressure, when it may by drawn off and bottled, thus greatly reducing the expense and difficulty incurred in producing wines of this class.

The second part of the invention relates to the apparatus by which the above result is effected, illustrative forms of which will be hereinafter described, as follows: First, an exterior metallic casing or wine-tank, made so as to be air or gas tight under strong interior pressure, and adapted to contain an interior open vessel of wood or other proper material, the apparatus being provided with a series of pipes and cocks for filling and drawing off its contents, and also with a safety-valve and pressure-gage. Second, a metallic wine-tank, as above, containing an interior vessel provided with a tight head or cover, and having a system of pipes, &c., arranged in a manner slightly differing from the first. Third, a triple or three way valve-cock, which is preferably used as a substitute for the arrangement of pipes and cocks shown and described under first.

OPERATION.

The cask B is partially filled with new wine in an active state of fermentation. In the first and third forms, where an open interior vessel is used, the wine may occupy two-thirds of the interior capacity of the tank A. Where a closed interior vessel is employed the wine

should not more than two-thirds fill the latter. Sirup may be added at this time, or at a later period, through the pipe D, as the manufacturer may prefer or the condition of the wine require. The stop cocks are left open for a day or two that the atmospheric air may be expelled by the gas generated in the wine, after which the cocks *d e* are closed and the safety-valve adjusted to the required pressure, one hundred pounds, for example, to the square inch. When the pressure reaches the desired maximum any excess of gas will escape through the valve, and will continue to be discharged until fermenmentation ceases. When the process of fermentation is completed the cock *c* is closed, and when the wine has become thoroughly cleared by the deposition of its sediment the shorter branch of the pipe E is connected with a bottling-machine and the wine bottled in the same manner as soda water. After the clear wine has been drawn off, a filter is attached to the longer branch of the pipe E, which is in like manner connected with the bottling machine, and the turbid wine near the bottom of the cask is drawn off and bottled in a similar way."

The first three claims of the patent are as follows, viz:

1. The process of producing sparkling wine by its own fermentation in bulk, by enclosing it in tight vessels provided with suitable pipes and cocks, and causing the wine to become charged with the gas generated by its own fermentation under any required amount of pressure, substantially as herein set forth.

2. An apparatus comprising an exterior closed vessel, A, and open interior vessel B, in connection with a

series of pipes or tubes, C D E, provided with cocks c d e, safety-valve I, and pressure-gauge J, all constructed, arranged, and operating substantially as and for the purpose herein described.

3. An apparatus comprising an exterior closed vessel, A, and interior closed vessel, B, in connection with a series of tubes, C F' F G D E, provided with cocks, c d e, safety-valve I, and pressure-gauge J, as and for the purposes herein specified.

It will be observed that every substantial element of the Meller and Hofmann device is found in Gilham's device.

We have here the closed casks in which the liquor is fermenting. We have here a space left above the liquid in the fermenting casks, which space is filled with the carbonic-acid gas evolved during fermentation. We have a safety-valve connected with the top of the cask, which may be set at any required pressure, and when the pressure in the casks exceeds that amount the surplus will blow off into the air. We have a gauge connected with the cask to register the pressure, and we have the process distinctly claimed of holding the fermenting liquid under pressure in the closed casks of the carbonic-acid gas evolved from its own body during fermentation. And inasmuch as Meller and Hofmann expressly say that their process is the same when applied to one cask, that it is, when applied to a series of casks, it is evident that they could have found all the processes and ideas which they claim as new, shown and described in this patent to Gilham, issued seven years previous. And if there be any difference in the appara-

tuses or processes shown in the two patents, the differences are only those which would be easily within the knowledge of a person skilled in the art of making alcoholic or malt liquors.

Taking the patents heretofore mentioned, namely, those of Wallace, Hicks, Dietrichsen and Gilham, it may be said that the field was fairly covered, and that there was nothing left for the inventor, except some particular form of apparatus. And it is doubtful if Meller and Hofmann's patent shows any invention in the way of apparatus, for their generator for artificially producing carbonic-acid gas was by no means new, but was as old as soda-fountains. All they did was to hitch it to the apparatus shown in the Wallace and Gilham patents. The fact that this constituted no invention will be more fully recognized when it is known that this artificial generator was long ago abandoned by the complainant, who is the assignee of Meller and Hofmann.

The Bartholomae Patent.

The Bartholomæ Patent, No. 201,892, dated April 2, 1878, is the same apparatus shown in Meller and Hofman's patent, and it appears by the testimony of George Bartholomæ, the patentee, (see Record, pp. 41–43,) that Bartholomæ was not the inventor of the apparatus, but saw it in Europe, but made oath that he was the inventor and had this patent issued to him, and that afterwards Meller and Hofmann applied for the patent in controversy, and the earlier patent to Bartholomæ was allowed to go by default on an interference with Meller and Hofmann, and that the latter gentleman assigned to Bartholomæ, and the present patent was issued with

much broader claims than the Bartholomæ patent contained.

The transaction was a very singular one all around, and the testimony of Batholomæ in reference to this matter, and the operations of Zwietusch in reference to the reissue of the Hicks patent, altogether make "*some mighty curus readin'.*"

The Schlaudeman Patent.

The patent issued to Henry Schlaudeman, June 11, 1878, No. 204,687, for an improvement in safety-valves for fermenting liquor casks, found in the Record on pages 95 and 96, shows a safety-valve constructed so that the weighted valve will be raised automatically if more than a certain quantity of carbonic-acid gas is generated. And this valve may be adjusted so as to make the pressure as great or as little as may be desired, and is exactly the equivalent of the water-column shown as the Meller and Hofman patent.

The Pfaudler Patent.

The patent issued to Pfaudler, July 2, 1878, No. 205,571, shows a different form of an apparatus for regulating the pressure in a series of fermenting vessels. This apparatus shows a safety-valve and a pressure gage and pipes connecting them with the fermenting casks.

The Straub Patent.

The device shown in Straub's patent, No. 208,771, dated October 8, 1878, is practically a water column and is intended to secure constant and uniform pressure upon beer while being treated in fermenting casks. In the specification of this patent (see Record, page 99,) he de-

scribes the old method of fermenting in open casks and allowing the liquor to overflow at the bung. This apparatus is for the same purpose substantially as Meller and Hoffman's device.

The Fehr Patent.

The patent issued to Frank Fehr is for regulating the pressure in beer casks, and for equalizing the pressure in casks connected to a receiver holding carbonic acid gas and provided with a safety valve and pressure gage, and is almost identical with the apparatus shown in Meller and Hoffman's patent, the artificial generator for carbonic acid gas being used in both cases.

TRANSLATIONS.

The state of the art is further shown in certain translation or extracts from books bearing upon the methods of making beer. The first one is found in the Record on pages 104 and 105, and is taken from the "School of the Beer Brewer," published prior to 1866, at which time it was bought in Cincinnati by the father of Mr. Frank A. Maus, as appears from his testimony in answer to Question 9, on page 56 of the Record. This extract describes an automatic vent bung for use upon casks containing beer in a state of fermentation, the bung being provided with a rubber strap or band which will rise when the carbonic acid gas has reached a certain pressure, allowing the surplus gas to escape, and concludes as follows:

"Then the vent will close itself until, through continued fermentation the collection of carbonic acid becomes again excessive. The tighter the tension of the

rubber band, the greater will be the amount of pressure necessary to lift it, or a larger amount of carbonic acid must be at hand, consequently the beer will be more sparkling."

There is also contained in the Record a copy of the application of Clement A. Maus, filed July 20th, 1878, for Letters Patent for an improved apparatus for regulating the pressure upon liquids under-going fermentation. The drawing accompanying this application has by some inadvertence been omitted from the Record, but the apparatus was simply a water column connected by with a cask containing the fermenting liquid, and by increasing and decreasing the water in the reservoir, the the pressure in the cask would be increased or diminished accordingly.

Loeper's Bung Apparatus.

The answer further sets up, in addition to the patents and other matters of record heretofore mentioned, that the pretended invention of Meller and Hoffman was anticipated by the device used by Jacob M. Loeper and Gen. Herman Sturm, at Indianapolis, Ind. The testimony of both of these witnesses is in the Record, that of Loeper beginning on page 52 and concluding on page 54. And it appears from this evidence that Loeper manufactured an automatic bung in 1867 for use upon beer casks, and a cut of this device is shown on page 53 of the Record, and that it was used in Gagg & Co's brewery at Indianapolis, and was intended for automatieally repeating the pressure of gas in casks or kegs while the beer was in the process of fermentation. And that it was ordered and

made to be used when the gases were escaping after the kraeusen had been put into the beer; and this particular matter is described in an extract from the "Brewers' Hand-book," published in Germany in 1854, and found on page 106 of the Record, and is as follows:

"After the prepared stock yeast has been added to the wort, there will form, after twenty or twenty-four hours, a circle of white foam on the surface of the beer near the sides of the vats, which gradually increases itself, and after twelve or fifteen hours further the whole surface is covered with a delicate white covering. From the bottom of the vat countless small air-cells rise, which, on reaching the surface, burst with a peculiar hissing noise, and make the wort turbid. The foam covering grows higher and uneven; some matter is separated thereby (by fermentation,) some of which falls to the bottom, and other parts are carried by the cells of carbonic acid gas to the surface, where at last they form curl-like gekrauselte, or curly elevations. The beer stands in kraeusen, which will now assume a brown color and merge into each other."

The word "Kraeusen" is a word meaning "curly," and is only used by German, and is not known to English or American brewers—but it is applied to that stage of fermentation when the new beer has been added to the beer in the shavings casks, to set up a secondary fermentation.

Gen. Sturm's Apparatus.

The testimony of General Herman Sturm is found in the record pp. 74–83. The witness was a thoroughly

scientific mechanic, and was engaged in manufacturing mathematical anc philosophical instruments and he says:

"A. Sometime in 1860 Mr. C. F. Schmidt, a brewer of this city, took me to his brewery and requested me to get up an apparatus for him, which would, during the fermentation of the beer, allow the carbonic acid gas to escape, and at the same time prevent the atmosphere from having access to the beer. I made him two such instruments, one of wood, partly, and the other one entirely of brass, with a rubber ball for a valve. I have a sketch of the same here, which I produce and make a part of my deposition, to illustrate my device, and which is as follows:

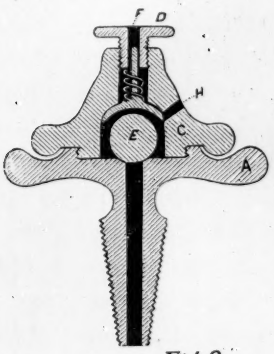


Fig. 2

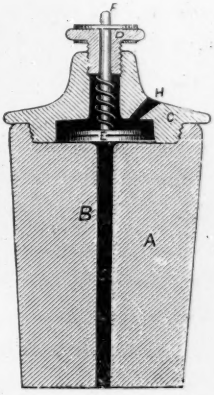


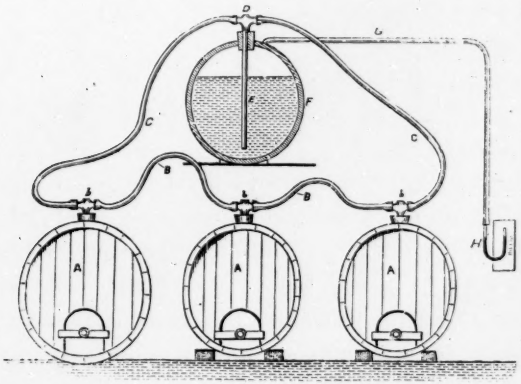
Fig. 1.

In the above sketch, Figure 1, is an ordinary bung of wood, perforated about a half-inch, as at B; C was a metallic cap, screwed into the top of the bung; this cap is also perforated, and the perforated thumb-screw, D, is screwed in the top of the cap, C; a valve, E, slides by means of the rod, F, in this thumb-screw and is held

down on the bung by means of spring, G; this spring and the thumb screw regulate the pressure with which the valve, E, is held down. The wooden bung, A, being inserted into the bung-hole of the cask, confines the carbonic acid gas in the same, which can only escape by lifting valve E, and through a hole bored into cap C, at H. By raising or lowering the thumb-screw D, any amount of pressure can be given. The apparatus works completely automatically, after being once regulated.

Figure 2 is identical with Figure 1, except it is made entirely of brass, and screwed into the bung of the cask. Instead of a metal valve, E, I used an india rubber ball, marked E. This apparatus also worked automatically after being once regulated to the pressure desired. After I had made some of these instruments, *they were applied at Schmidt's brewery, to some large fermenting casks containing beer*, and they worked to the satisfaction of Mr. Schmidt, except that a foam arising from the fermentation process would sometimes interfere and clog the valves, and Mr. Imbry, who had a brewery opposite the Madison depot, and for whom I had made some of these instruments, requested me to overcome this difficulty, if possible. I then got up a very simple apparatus, which is thus described: I inserted into the perforated bung of each fermenting cask a half-inch or three-quarter inch brass tube, to which I attached an india rubber tube of corresponding size. These india rubber tubes from each cask were led to, and were fastened at the other end by means of a many-way cock, to a three-quarter inch brass pipe, about three feet long, common to all, which was inserted through the bung of another cask, to within six inches of the bottom of the

same. This cask contained sufficient water to cover the end of the pipe introduced about two or three inches. The foam passing from the main fermenting casks through each of the branch pipes to this main pipe leading into the water, would be washed off and dropped to the bottom, and the gas, after passing through the water, would pass through an instrument, Figure 2, above described, which was inserted in the head of the water barrel, without clogging it. This apparatus was put up and used at Mr. Imbry's brewery on his fermenting casks, and I subjoin a sketch of it, which is as follows:



[*Device made by Gen. H. Sturm, and applied by him to Fermenting Casks in the Breweries of C. F. Schmidt and Charles Imbry, Indianapolis, Ind., in the spring of 1861.*]

A A A—Represent casks in which beer is fermenting.

B B—Flexible tubes connecting the casks together at the bung-holes by the two-way cocks, b b b.

C C—Are tubes connecting the casks with the wash-barrel, F, at the two-way cock, D.

E—A pipe leading into the water in the wash-barrel.

G—A pipe leading from the air space in the wash-barrel to the mercury gauge, H.

The above is correct. H. STURM.]

Very soon after making this apparatus, I simplified it very much by leading the gas from what I will call the washing cask, by means of an India rubber tube to a glass syphon containing about two inches of mercury, which would be equivalent to about the pressure of one pound of atmosphere. In this way the apparatus, shown in Fig. 2, was dispensed with, and the pressure could be regulated by adding to or reducing the height by the mercury column. *This apparatus, I was informed by Mr. Imbry and by Mr. Schmidt, worked better than either of the vents shown in figures 1 and 2, being completely automatic. This last device with the mercury was used upon the fermenting casks by both Mr. Schmidt and Mr. Imbry in 1860, just before the war. I think this same apparatus was used in Meikel's brewery about the same time. I quit the business in April, 1861.*

Q. 4. Wherein lies the difference, if any, between the principle of operation of these four several devices described by you, for regulating the pressure in fermenting casks?

A. The only difference I know of is, that by using Figure 1 and 2, without using the washing cask of which I have spoken, the foam would clog the valves; and it was also necessary to regulate the pressure by raising or lowering the thumb-screws, D. This was not necessary if the mercury gauge was used. I call it a "gauge" because it acted automatically as such, after you had filled the syphon with the proper quantity of mercury.

Q. 5. Do these differences, of which you speak, relate to the principle of operation in each case, or to the mechanical construction rather?

A. They relate to the mechanical construction. The actual principle, so far as I know, is alike in all; that is, you regulate the pressure of carbonic acid gas in the fermenting casks automatically.

Q. 6. Then I understand you, in other words, that the only substantial difference between these several devices is, that in the first three instances the carbonic acid gas escapes from the fermenting casks through outlets, by overcoming the pressure of an elastic spring, and in the last case by overcoming the pressure of a column of mercury?

A. That is just the way they work, and that is all the difference.

Q. 7. Having reference now to your last mentioned device, remove the mercury gauge, increase the water in your barrel so as to make it a water-column, would or would not the weight of that body of water regulate, automatically, the pressure of the carbonic acid gas in the cask?

A. It would, as a matter of course. By filling the cask with water until the surface of the water would be about two feet higher in the mouth of the pipe, you would have the same pressure in the fermenting casks as you had by using the two inches of mercury.

Q. 8. In this later case what would regulate the pressure in the fermenting casks?

A. The height of the water above the mouth of the pipe.

Q. 9. What would be the difference in principle of operation between the device changed, as I have last mentioned, and the four devices described and figured by you as having been constructed in 1860?

A. The principle would be the same; the difference would be merely in the mechanical construction of the apparatus.

Gen. Sturm made and put this mercury guage regulating apparatus in two separate breweries in Indianapolis, and the use they were applied to is thus described in his answers upon cross-examination:

Q. 5. How many of those devices did you make for each of the two breweries named?

A. I can not recall the exact number now. But I do know that of the mercury gauges I made only two, one for each brewery. The making of the mercury gauges was about the last piece of work I did before leaving the business. I saw the mercury gauges in use several times.

Q. 6. Can you state the particular kind of casks to which your devices were applied, and for what particular purposes, and at what particular stage of the fermentation they were used?

A. I know too little of the brewing business and the terms used to give you a correct answer, I am afraid. The casks were large casks, probably seven feet in diameter, lying in a row on their bilges. As my recollection serves me now, there was an opening in the head on the under side, called the man hole, which was closed. I understood that the beer in these casks was intended for larger beer particularly, and was undergoing the second stage of fermentation. Both of these brewers were Germans and our conversation was conducted in German.

Q. 7. But you can not state from your own per-

sonal knowledge on what kind of casks, or for what purpose, or at what stage of fermentation your devices were applied?

A. My knowledge on this subject extends only so far—that I saw the casks as I have described, that they contained beer in a stage of fermentation, which Mr. Schmidt or Imbry, either or both, told me was the "untergährungs" process. I attached the apparatus myself to these casks.

Q. 8. But you do not know whether they were what are commonly called "shavings-casks," or not, do you?

A. They had another kind of cask or vat open at the top, and larger in diameter at the bottom than at the top. I do not mean these. I do not know anything about shavings-casks, or whether the ones to which my device was applied were shavings-casks or not.

Q. 9. Do you know whether the beer was in that stage when there is a lively fermentation occasioned by the putting in of "kraeusen" or "young beer," as it is called?

A. No, I do not know. I am not familiar with that business, and paid no attention to it. *All I do know is that some time after I attached my devices, an active stage of fermentation set in, and foam would rise sufficient to interfere with the working of my devices*, Fig. 1 and Fig. 2.

Q. 10. Do you know how long your devices were kept in use, and for what particular purposes they were applied?

A. I can not say how long they were kept in use,

but the object, as I have already stated, was to confine the carbonic acid gas in the fermenting casks, and to allow the same to escape without injuring the casks. As Mr. Schmidt said to me, when he first spoke to me on the subject, the gas, if confined, would burst the cask, and if air had access to the cask it would spoil the beer, and his object was to prevent both of these actions. My apparatus accomplished these objects, whenever I saw it, during the last two or three months that I attended to the business.

See Record, pp. 78 and 79.

On re-examination he testified as follows:

Q. 1. As I understand you, your devices were applied in the breweries of Schmidt & Imbry, to casks containing beer in such a stage of fermentation that foam containing particles of yeast, would freely pass out from the vent of the bungs when they were used, and into the water barrel when the mercury guage was used; am I correct?

A. That is correct.

Record, pp. 81–82.

And Mr. Frank A. Maus one of the defendants, and a brewer of long experience, being recalled, and asked.

"Q. 2. Please examine the answer of General Sturm to the first question on re-examination, and state what stage of fermentation of lager beer it is that he has there described.

A. I have read the answer referred to, and as he describes it, by the passing over of foam, as he states, *it indicates that the beer in the casks, to which he applied his apparatus, was while the beer was in the shavings casks, or in the last stage of fermentation.*" Record p. 106.

This evidence of Mr. Maus is directly corroborated by Prof. Ruschhaupt, the complainant's expert. He testifies as follows on the examination in rebuttal:

"Question. I desire for the better understanding of the Court, to have you define certain technical terms which occur quite often in the books and in the language of experts. For example, what is 'kraeusen' or 'kraeusenber'?

Answer. Kraeusen is a fermenting sweet beer wort, obtained during the first stage of the main fermentation, in which a foam of a very dense, curly, white appearance is formed on the surface; hence the German word 'kraeusen,' which means curls.

Q. Can you define what 'kraeusen stage,' in shavings casks means?

A. It is that fermentation which sets in after the 'kraeusenber' has been added. It is caused by the yeast cells of the kraeusen material; gradually this new fermentation becomes so lively that foam floats out of the bung hole for a longer or shorter time, depending upon the strength and quantity of the kraeusen as well as of the quality and quantity of the kraeusen yeast, say from three to eight days and longer. Gradually it reaches its maximum and falls back, the bubbles of the foam becoming larger and less frequent. The visible kraeusen stage sets in, according to the quantity of the kraeusen, in about two days.

Q. What is the reason that it takes about two days for the kraeusen stage to begin after the kraeusen is added?

A. The reason is that the kraeusen beer is mixed

with older beer of a lower temperature and of less extract or nutriment, whereby the activity of the yeast is weakened accordingly.

Q. What do brewers call this intermission between the addition of the yeast and the visible stage of fermentation?

A. We have no technical term for this intermediate time between the adding of the kraeusen and the commencement of visible life; *but the moment you see foam coming out of the bung-hole, then the kraeusen is said to have commenced its 'grip.'*

Q. Now, do I understand you to say that when the liquid shows visible marks of the yeast having commenced to work, then the kraeusen stage begins?

A. The kraeusen stage begins as soon as the kraeusen are added to the beer, but the new fermentation caused by the kraeusen material is not visible; still, it commences as soon as kraeusen are added.

Q. Now where does the kraeusen stage in shavings casks end, if there is any definite time drawn? Does the liquid not continue to ferment for a number of days after overflowage has ceased?

A. There is no definite line drawn. As sometimes the term is used, the kraeusen stage in shavings casks sets in when the foam shows at the bung hole, and it ceases with the overflowage of the foam and the diminishing of such manifestations, but in fact the kraeusen stage sets in at the moment the kraeusen are added to the beer, and it continues until the kraeusen have answered their main object and the clarification of the beer is complete.

Q. The term 'kraeusen stage in shavings casks' is comparatively a new one, is it not?

A. It is; that is to say, it has been in general use in breweries since about fifteen years, and particularly in this country. It followed the introduction of shavings casks, which are comparatively a modern progress in this country." Record pp. 146–147.

THE QUESTION OF INFRINGEMENT.

Having thus considered the state of the art prior to the use of the Meller and Hoffman patent, as shown by thy records of the U. S. Patent Office, and from scientific treatises on the art of brewing, and in view of what had been accomplished by Sturm, Loeper, Wallace and Maus, it will now be proper to considered upon what grounds and what claims it is insisted that the defendants have infringed the Meller and Hoffman patent.

In order to sustain the charge of infringement the complainants have taken the deposition of Otto Zweitusch, and his testimony on this subject is given upon his direct examination as follows:

"Q. 6. Were you ever at the defendant's brewery before this suit was commenced?

A. I was, the latter part of October, 1880.

Q. 7. State whether you then had any conversation with the defendants, or either of them, about their use of the process or apparatus for treating beer, now claimed to be an infringement of the complainant's patent. If you had any such conversation, please state fully what was said.

A. The time I went there first, I asked them

whether they were using bunging apparatus in their brewery by which the pressure of the carbonic-acid gas was regulated automatically by a water column. They said, yes, we have an arrangement similar to that which I represent for the New Process Fermentation Company —using it on twenty-four shavings-casks. Then I informed them that they infringed the patent of Meller & and Hofmann, of which the New Process Fermentation Company is the owner. One of those gentlemen said to me that they had applied for a patent themselves, and did not want to do anything about taking license from the company until they knew something particular from Washington. The second time I was in their office, sometime after, one of those gentlemen made me a little sketch, showing in what manner their arrangement was working. I did not find any difference in the results by such an arrangement, by their apparatus, than in the Meller and Hofmann patent.

Q. 8. From that skeetch which they showed you and the explanation which they gave you, please state briefly the object for which the apparatus was used and the manner in which they used it.

A. The object is for clarifying the beer more rapidly and ripening the beer for the market quicker, and better, by having a constant pressure, or equal pressure, in the shavings-casks during the clarifying process. From the sketch shown me, I found that each shavings-cask was connected with a pipe which was leading to a kind of closed reservoir or tank; from this tank another pipe led to the top of a water column, from which point all those shavings-casks run in by outlet to the bottom of the water column.

Q. 9. State wherein, if at all, the apparatus and process which defendants were using in their brewery, differs from the apparatus and process described in the Meller and Hofmann patent sued on in this cause.

A. The process does not differ at all, neither the working of the apparatus. The apparatus itself only differs from that of Meller and Hofmann by having a reservoir, or closed tank, between the connection pipe from shavings-casks to the water column.

Q. 10. In your opinion does the defendant's mode of treating beer as applied at their brewery, and as they described it to you, embrace and apply the invention described and claimed in patent No. 215,679, sued on in this cause? If you say it does, please point out which claims you consider defendants infringe by its use.

A. Yes, it does in my opinion. It infringes the first, second, third, fourth, sixth and seventh claims. I cannot say about the fifth and eighth claims particularly."

Record pp. 36–37.

Upon cross-examination, Mr. Zweitusch gives his views of the scope of the Meller and Hofmann patent, as follows:

"X-Q. 10. What is the krauesen stage of the beer?

A. The kraeusen stage of the beer is, after it is taken from the ruh-casks into the shavings-casks, and young beer, or kraeusen, is added for the purpose of refermentation of the beer, clarifying the same, and making it suitable for the market.

X-Q. 11. May the plaintiff's process be used on single casks or upon a series of casks?

A. It is no matter where it is used; the effect is the same.

X-Q. 12. Will the plaintiff's process be preserved in all different mechanical constructions which hold beer in closed casks under controllable pressure of carbonic acid gas?

A. During the time of manufacturing the beer; yes.

X-Q. 13. Will the process be preserved after the beer is manufactured, by holding it under such pressure of carbonic acid gas?

A. Yes, that is involved, too.

X-Q. 14. Will any arrangement or apparatus by which the beer is held in closed casks under controllable pressure of carbonic acid gas, embody the principle set forth in the plaintiff's claim?

A. Yes, it will.

X-Q. 15. Then the plaintiff claims all processes of manufacturing and holding beer under controllable pressure of carbonic acid gas, by whatever apparatus that may be accomplished?

A. Yes, sir.

X-Q. 16. Would an apparatus constructed with a metal spring instead of a water column, which spring would yield to the excessive pressure of carbonic acid gas, and would control and hold the gas in the cask when not excessive, embody the plaintiff's process substantially?

A. If such an apparatus with such a spring will work automatically, yes.

X-Q. 17. Suppose shavings-casks to be supplied with

bungs in which there is a valve, and the valve to be held down by a wire or metal spring, which spring will yield if the gas becomes excessive, and allow the gas to escape, or, if there is not an over-charge of gas, will keep the valve closed, thereby keeping the carbonic acid gas in the cask, would such an arrangement embody substantially the plaintiff's claim and process?

A. Yes.

X-Q. 18. Suppose an apparatus constructed with a rubber spring, but otherwise substantially as detailed in my last question, would that also embody the plaintiff's process and claim?

A. If it works automatically, yes.

X-Q. 19. Would not a rubber or wire either, that would hold a valve down until the cask was charged sufficiently with carbonic acid gas to force the spring or rubber up, be as much of an automatic arrangement as a water column which held the gases in or allowed them to escape when over-charged?

A. It is an automatic arrangement only while it is in first-class order, but rubber and spring will never regulate as well as a water column.

X-Q. 20. Suppose the pipe that enters the water column at its base, instead of entering at the base, should enter at the top, but extend through the column of water to near the base; would the effect and operation of the water column be the same as when the pipe enters at the base of the water column?

A. There is no difference whether it goes inside or outside of the water column as long as it is led near to the bottom of the column.

X-Q. 21. Is the principle of the water column its weight by which the gas is obstructed or held down?

A. According to the height of the water column the pressure of the gas is regulated.

X-Q. 22. How does the water column regulate the gas? Is it by obstructing the escape of the gas?

A. The over-pressure, yes.

X-Q. 23. Suppose an apparatus constructed in this way—the casks instead of being connected by short pipes, with a common pipe leading to the water column, there was a pipe running from one cask to other cask, and then extended into the water column in such a way that if the gas in one cask was too much it could escape through the pipe directly into the other cask, and in either or both the gas should be too much, it could escape through the same pipes to the water column, and thus out through the water column—is such an apparatus, and the principles therein, the same substantially as set forth and claimed by plaintiffs in their patent?

A. That is the very principle claimed in this patent.

X-Q. 24. Have the cocks anything to do with the principle of the process or the working of the apparatus, any further than to allow one, by turning them, to leave the pipes all open; or, if one cask should be emptied or taken off, or for any other purpose they should desire to close the pipes as to one or more, do the cocks cut any figure except for the purpose of closing the pipes in that way?

A. No, sir.

X-Q. 25. Suppose two casks in which it is desired to keep the beer under controllable pressure of carbonic-acid gas; suppose one pipe leading from one into the other, whereby gas may escape from either into the other, and the same pipe extending to the water column, as previously described; suppose the proper amount of water for regulating the gas is in the water column; will the apparatus work the same with the pipes all open, and without any cocks?

A. It has to work the same, but it only requires to draw off such two casks at the same time.

X-Q. 26. Does the principle of the several claims made by the plaintiff, except the eighth, consist in the keeping of beer while in the process of manufacture, or, after manufactured, in preserving it, under automatic pressure of carbonic-acid gas?

A. Yes.

X-Q. 27. Suppose an apparatus constructed as follows: Two shavings-casks with a pipe leading from one into the other, whereby the gas may escape from one into the other at will; suppose that pipe to be connected anywhere, either at its center or near one extreme, with another pipe which leads into a water column; will an apparatus constructed in that way be an infringement upon the claims of the plaintiff in the patent sued on?

A. Of course it is.

X-Q. 28. Is that substantially the same as the plaintiff's?

A. Yes.

X-Q. 29. Is there any claim on the size of the water column?

A. No.

X-Q. 30. That makes no difference.

A. No.

X-Q. 31. If an apparatus was constructed, then, in all particulars, so as to be no infringement, unless the water column was an infringement, would the size or construction of the water column cut any figure?

A. No; the water column acts on a natural law; by having two feet of height of water, it will give accordingly one pound pressure, no matter whether the diameter is a quarter of an inch or ten feet.

The witness is now brought upon delicate ground, and is questioned as to the scope of the Hicks patent, which he had brought and tried to have re-issued to him so as to cover the very ground in controversy, and the examination proceeds as follows:

* * * * * *

X-Q. 33. Are you familiar with the Hicks patent?

A. Yes, I am.

X-Q. 34. Would an apparatus constructed under and in pursuance of the Hicks patent and specification, be an infringement of the plaintiff's patent?

A. If it is used during the manufacture of beer to regulate automatic pressure of carbonic-acid gas, yes.

X-Q. 35. Is the principle of the Hicks patent substantially the same principle as the plaintiff's for controlling the beer?

A. It is not.

X-Q. 36. What is the difference in principle?

A. It is quite different in mechanical construction.

X-Q. 37. Admitting that the mechanical construction is different, is the principle by which the beer is controlled under a pressure of carbonic-acid gas the same? and if not the same, why would there be an infringement by the use of the Hicks patent?

A. It is the same whenever it is used during the manufacture of beer, and it acts as an automatic relief or carbonic-acid gas.

Record pp. 38-41.

If the complainant's own manager, who testifies that he is a brewer of many years experience, understands the company's own patent, it is entirely clear that it covers all the prior prior patents cited in defendant's answer, and also the regulating devices of Loeper and Sturm.

Of course this is a sort of *reductio ad absurdum*.

But a singular feature of all this sort of reasoning, is that Zwietusch is not satisfied that the apparatus used by defendants, which is a water column regulator, infringes the only claim of the Meller and Hofmann patent,(the 8th) which is for an apparatus, the first seven claims of the patent being what are called "process" claims. In fact it was not claimed upon the hearing that the Maus apparatus did infringe the solitary apparatus claim of the Meller and Hofmann patent, and Judge Drummond so found in his opinion.

THE MELLER & HOFMANN CLAIMS.

According to the testimony of Zwietusch, who was the only witness upon the subject, the defendants by us-

ing an apparatus different from the one claimed to have been invented, for regulating the pressure of gas upon beer in their shavings casks, have infringed the first, (1st) second, (2d) third, (3rd) fourth, (4th), sixth, (6th) and seventh (7th) claims.

The first three claims relate to the same stage and are practically the same thing—the holding of beer under automatically regulated pressure in the shavings casks, or while in the kraeusen stage.

The fourth claim relates, nominally to holding the beer under such pressure "after it has passed the kraeusen stage," but is practically the same as the first three, for the beer is still in the "shavings casks."

The sixth claim relates to holding the beer under such pressure at any time during its manufacture.

The seventh claim relates to the "shavings casks" and is the same as the first four, only the plural is used, "a series of shavings casks."

The witness, Zwietusch, testified that defendants admitted they were using a water column apparatus in connection with twenty-four shavings-casks, but the casks were connected to an intervening cylinder, which was in turn connected to a water column.

Record, p. 37.

The claims mentioned are, therefore, practically repetitions of each other, and as such may all be considered together. For in fact, an apparatus of this sort, whether it be a weighted valve like that of Hicks, or Gilham, or Dietrichsen, or Loeper, a mercury gauge like the device of Sturm, or a water column like that of Wallace, or Meller and Hoffman, is never applied in the

manufacture of beer to anything but the shavings-casks.

For in the first stage the fermentation is conducted in open vats.

See Maus' testimony, answer to question eleven (11), Record, p. 56. He says:

"Q. 11. Will you state, in a general way, the process of brewing, commencing with the time when the wort is drawn off into the kettle, and from thence on, to and including the shavings-casks?

A. The fluid drawn from the mash tub, when drawn off is called wort; is placed in the kettle and boiled from one-half to two hours, according to the brewer's notion; then hops are added, and boiling continues from a half hour to an hour and a half; then the wort is withdrawn from the kettle, and is cooled to the required temperature, and placed in large vats, called fermenting vats, which are *open at the top.* Then yeast is added. It is permitted to stand from ten to twenty days. The fermentation during the first few days is called the "kraeusen stage." When the beer is withdrawn from the vats it is usually placed in large casks, for the purpose of letting it rest and become aged. It remains in those casks in a dead state, free from fermentation from two weeks to six or eight months, and is known as *ruh*, or lager beer. When needed for the market, the *ruh* beer is placed into shavings-casks. The shavings-casks are large casks, and contain shavings made of beechwood. Then a small per cent. of beer taken while in the kraeusen stage is added, which causes the beer in the shavings-casks to ferment in a mild form. The cask is then attached to our apparatus.

The beer will clarify and charge itself with sufficient carbonic acid gas in from eight to fifteen days, when it is drawn into kegs and delivered to customers."

The beer, after fermentation in these open vats, goes into storage casks, called, in German, ruh, or rest, casks. There is little or no fermentation here, as these casks are kept in cool cellars, having a temperature a little above the freezing point, and as there is little or no fermentation, there is little or no pressure. The beer is literally *at rest*.

There would, then, be no earthly use of putting on a safety-valve upon such casks, for no gases are arising, and the beer can not spoil as it is kept cool. The only point of the manufacture where it would be convenient or necessary to apply a safety bunging apparatus would be when the beer had been transferred from the storage, or rest casks, to the shavings-cask, and the new beer, "kraeusen," had been added to start a second and lively fermentation.

The apparatus is of no value whatever at any other point in the manufacture of beer. And it was at this precise point that the apparatus of Sturm was applied in the breweries of Schmidt and Imbry, in the city of Indianapolis, more than seventeen years before the date of Meller and Hoffman's patent, and it was at the same stage of the manufacture of beer that the safety bung of Loeper was applied in the year 1867.

See Record, pp. 52–54.

And Wallace testifies that as early as 1867 he offered his apparatus to brewers in Cincinnati for a similar purpose, and in 1874 or 1875, to the defendants,

Maus, and to Schmidt, another brewer in Indianapolis.

Record, p. 65.

The complainant therefore, practically insists that the use of any of the devices shown by the patents set up in defendant's answer for regulating the pressure upon beer at any stage during its manufacture is an infringement of the Meller and Hofmann patent, because it is a patent for "*a process.*"

THE PROCESS THEORY.

Let us examine this matter briefly. For in view of the careful and exhaustive treatment of this question by Judge Drummond in his opinion given in the case, it will only be repeating his argument to go into the question at any great length. And in doing so it will be necessary to refer to the decisions of this Court on the subject.

One of the earlier cases was that of *McClurg* v. *Kingsland*, (1 Howard, 202,) which was a suit brought by the plaintiffs against the defendants for a an infringement of a patent granted to Harley, for an improvement in the mode of casting chilled rollers and other metallic cylinders and cones.

On the trial it appeared in evidence that it had long been desired to find out some mode by which iron rollers or cylinders could be so cast that when the metal was introduced into the mold it should cause a spherical or rotary motion, by which the dross would be thrown into the center, instead of out to the surface of the cylinder.

By the old mode the metal was conveyed from the furnace to the mold through a pipe placed in a horizontal or perpendicular direction.

The mode alleged to have been invented by Harley is thus described in the specification annexed to the patent.

"The tube or tubes, or passages called gates, through which the metal is to be conveyed into the mould, shall not enter the mould perpendicularly at the bottom, but slanting or in a direction approaching to a tangent of the cylinder, but if the gates enter the mould horizontally, or nearly so, shall not enter in the direction of the axis of the cylinder, but in a tangent form, or inclining toward the tangent of the cylinder."

Thus the thing patented consisted solely in changing the direction of the tube, which conveyed the metal to the mould, from a horizontal or perpendicular position to an angular one.

It produced the desired effect and was highly useful.

The case went off on the question of license, but it is a clear that the Court was of the opinion that Harley's method of casting was a new discovery and was as such independent of the particular form of mechanism which he employed.

Gayler v. *Wilder*, (10 Howard, 477,) was a suit brought for the infringement of a patent right for the use of plaster of Paris, in the construction of safes or fire proof chests, of which Fitzgerald was the patentee.

The claim of the patent was for "the application and use of plaster ofParis, or gypsum, in its raw state, prepared as above, either alone or with mica, for the construction of iron chests or safes, in the manner above described, or in any other manner substantially the same."

The safe as maufactured consisted practically of two iron chests; an outer and an inner one, and the space between them filled with plaster of Paris, whose properties was such that "by the application of intense heat it imparts a vapor or gas, or some other properties which effectually stay the progress of the fire and resist the influence and effect of the heat."

This case went off on the question of anticipation, but the majority of the Court held that the discovery of a new art or the re-discovery of a lost art, which was a useful improvement, would be entitled to a patent under the United States laws.

A leading and certainly a more important case than either of these cited is that of *O'Reilly* v. *Morse*, (15 Howard, 62,) Morse's 8th claim being "for the use of the motive power of the electric or galvanic current, however developed, for making or printing intelligable characters, letters, or signs at any distance, being a new application of that power."

The Court, (Mr. Chief Justice Taney), held that this claim was void and in the opinion considered the Hot Blast case of Neilson v. Harford, the Gun Stock case of Blanchard v. Sprague, (3 Sumner, 540), and the case of Wyeth v. Stone, (1 Story, 270).

This opinion has often been criticised, and Morse's eighth claim, if the question could now arise, would perhaps be held valid upon the ground set forth in the last decision of the case of Leroy v. Tatham, that it was not the mere function of the machine that Morse had invented, but it was a new discovery in the realms of science, and as such discovery it was entitled to a patent.

Leroy v. *Tatham*, (14 Howard, 156,) was a suit brought by Tatham on a United States patent issued for an improvement in the manufacture of lead pipes.

The claim was for a combination of certain parts of mechanism, when used to form pipes of metal under heat or pressure in the the manner set forth, or in any other manner substantially the same.

The discovery or invention was as follows:

"That lead recently become set under heat or pressure in a close vessel would re-unite perfectly after a separation of its parts."

The Court below was asked to charge the jury that the state of the lead when used as described in the plaintiff's specification, being a principle of nature, is not the subject of a patent either alone or in combination with the machine described.

The Court refused this charge and instructed the jury that the new discovery was patentable.

The Court further charged the jury that in the view taken by the Court in the construction of a patent it was not material whether the mere combination of machinery referred to were similar to the combination used by Hanson, because the originality consisted not in the novelty of the machine but in bringing a newly discovered principle into practice, by which a useful article of manufacture is produced, a wrought pipe as distinguished from a cast pipe.

This Court reversed the decision of the Court below on the ground that the Court was wrong in instructing the jury that "the novelty of the combination of the

machine specifically claimed by the patentee as other inventions was not a material fact for the jury to consider."

Several of the Justices dissented from this opinion of the Court, and the case afterwards came up again, this time on an appeal from a decree in equity in favor of the owners of the Hanson patent. (See 22 Howard, 132). The opinion of this Court was delivered by Mr. Justice McLean, affirming the decision of the Court below on the main question, the Court holding that on account of the novelty of the discovery, namely that of a new principle in nature, by means of which the peculiar power of lead to reunite itself under heat and pressure under certain circumstances, the patent was entitled to be considered for a process, as varied forms of machinery might be adapted to utilize this new discovery.

This latter case then practically over-rules the former decision of this Court in the first case between the same parties.

The case of *Corning* v. *Burden*, (15 Howard, 250), was a suit for infringement of patent issued to Burden for a new and useful machine for rolling puddle balls or other masses of iron.

The Court below held that the Burden patent was practically for the process, and that he was entitled to be considered the discoverer of a new process or method of preparing puddler's balls for the manufacture of iron. And the Court said:

"A process *eo nomine* is not made the subject of a patent in any act of Congress. It is included under the

general term 'useful art.' An art may require one or more processes or machines in order to produce a certain result or manufacture. This term machine includes every mechanical device, or combination of mechanical powers and devices, to perform some function and produce a certain effect or result. But where the result or effect is produced by chemical action, by the operation or application of some element or power of nature, or of one substance to another, such modes or methods or operations are called processes. A new process is usually the result of discovery; a machine of invention. It is for the discovery or invention of some practicable method or means of producing a beneficial result or effect, that a patent is granted, and not for the result or effect itself. It is when the term process is used to represent the means or method of producing a result that it is patentable, and it will include all methods or means which are not effected by mechanism or combinations. But the term process is often used in a more vague sense, in which it can not be the subject of a patent. Thus it is said that a board is undergoing the process of being planed, grain of being ground, iron of being hammered or rolled. Here the term is used subjectively or passively, as applied to the material operated on, and not to the method or mode of producing that operation, which is by mechanical means or the use of a machine, as distinguished from a process. In this use of the term it represents the function of a machine, or the effect produced by it on the material subjected to the action of the machine. *But it is well settled that a man cannot have a patent for the function or abstract effect of a machine, but only for the machine which produces it.*"

In the case of *Bean* v. *Smallwood*, 2 Story 408, Mr. Justice Story said:

"He (the patentee) says that the apparatus, stated in this last claim, has been long in use, applied, if not to chairs, at least in other machines to purposes of a similar nature. If this be so, then the invention is not new, but at most is an old invention, or apparatus, or machinery applied to a new purpose. Now, I take it to be clear, that a machine, or apparatus, or other mechanical contrivance, in order to give the party a claim to a patent therefor, must in itself be substantially new. If it is old and well-known, and applied only to a new purpose, that does not make it patentable."

This is old and well settled doctrine, that the applying of an old machine to a new use, or to produce a new result, is not patentable.

Boulton v. *Bull*, 2 H. Bl. 487.

Losh v. *Hague*, Web. Pat. 207.

Crane v. *Price*, 4 Mann. & Granger 580.

Huddart v. *Grainshaw*, Web. Pat. 8.

Howe v. *Abbott*, 2 Story 190, 193.

Kay v. *Marshall*, 5 Bing. N. C. 492.

Gibson v. *Brand*, 4 Mann. & Granger, 179.

Hotchkiss v. *Greenwood*, 11 Howard, 248.

The case of *Silsby* v. *Foote*, (22 Howard, 378,) was the stove-damper case, and was on a patent issued to Foote for the "application of the expansive and contracting power of a metallic rod by different degrees of heat to open and close a damper which governs the admission of air into the stove, when such rod was acted

upon directly by the heat of the stove or the fire which it contains."

The principal objection to the validity of the patent was that the nature of the subject which it contained was exactly similar in its general character to the eighth claim of Morse, which this Court decided to be invalid in the case of *O'Reilly* v. *Morse*, 15 Howard 62. Foote, however, disclaimed the broad discovery of the expansibility of iron under heat, and the contractibility when cooled, and the Court held that the disclaimer of Foote did not come in too late, and affirmed the case on the main question, though it was reversed as to interest and costs.

The case of the *Rubber Company* v. *Goodyear*, 9 Wallace 788, involved the construction of the Goodyear patent for treating India rubber. The original patent was issued in 1844, and in 1849 the patent was reissued by the executor of Goodyear in two divisions, Nos. 1,084 and 1,085. No. 1,084 was for the article produced by the process. No. 1,085 was for the process by which vulcanized India rubber is manufactured. The following is the language of the Court:

"It is contended by the appellants that both these patents are invalid, for two reasons: (1), because they are broader than the claims of the patent surrendered by the executor; and, (2) because one is for a process, and the other for the product of that process. The Court below held the objection to the patent for the process—that it is too broad—fatal to its validity, because the claim embraced 'other vulcanized gums' besides India rubber as articles to which the process was to be

applied. From this part of the decree below no appeal was taken by the complainants. It is, therefore, final and conclusive in its effect, and the patent to which it relates must be laid out of view. It remains, therefore, to consider the patent No. 1,084, which is for the product.

The claims of the patent reissued to Charles Goodyear, deceased, in 1849, are as follows:

"What I claim as my invention and desire to secure by Letters Patent is the curing of caoutchouc, or India-rubber, by subjecting it to the action of a high degree of artificial heat, substantially as herein described, and for the purposes specified.

"And I also claim the preparing and curing the compound of India-rubber, sulphur, and a carbonate or other salt, or oxide of lead, by subjugating the same to the action of artificial heat, substantially as herein described."

The claim of the patent for the product is thus expressed:

"What is claimed as the invention of Charles Goodyear, deceased, is the new manufacture of vulcanized India-rubber, (whether with or without other ingredients,) chemically altered by the application of heat, substantially as described."

The specification among other things, contains these clauses:

"For many purposes the manufacture is improved by the addition of other substances than sulphur, among which white lead is one of the best, and which, when

used, may by combined in the mixture above described, in the proportion of seven parts by weight, thereby forming a triple compound. Other salts may be used with advantage, and coloring matter may be also incorporated with the mixture, for the purpose of imparting colors to the product.

"And other materials, such as cotton, silk, wool, or leather, may be incorporated or combined with the India-rubber and sulphur, thereby modifying the strength, elasticity, or other qualities of the new manufacture for particular purposes; as it is found that the new substance or product will be produced whenever the essential elements of rubber, sulphur, and heat are used, whether such other materials are incorporated or not."

"Patentable subjects, as defined by the patent law, Act of 1836, are "any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvements on any art, machine, manufacture or composition of matter." A machine may be new, and the product or manufacture proceeding from it may be old. In that case the former would be patentable and the latter not. The machine may be substantially old and the product new. In that event the latter, and not the former, would be patentable. Both may be new, or both may be old. In the former case both would be patentable; in the latter neither. The same remarks apply to processes and their results. Patentability may exist as to either, neither, or both, according to the fact of novelty, or the opposite. The patentability, or the issuing of a patent as to one, in nowise effects the rights

of the inventor or discoverer in respect to the other. They are wholly disconnected and independent facts. Such is the sound and necessary construction of the statute. The objection to the patent, we think, is also not well taken."

In this case it will be seen Goodyear had discovered a new principle, namely: that India rubber treated by and under the action of heat changed its nature so as to become hard and non-elastic; and if he also invented the machine, or apparatus, by which the process was operated, then, in the opinion of this Court, he could have had a patent for the process itself as a new discovery, and he could have had a patent for the machine by which the process was carried out.

The case of *Mowry* v. *Whitney*, (14 Wallace, 620), involved the process of making car wheels invented by Whitney, in which, after the car wheels had been cast, and as soon after as they could be handled safely, they were taken from the mould while yet hot, placed in an oven and reheated to a point a little below that in which fusion commences, and then allowed to cool gradually, the object of this being to make the wheel equally strong in all parts, the tire or rim of the wheel having been chilled to make it tougher and harder, while the central body of the wheel was softer.

The principal questions in the case arose out of the report of the master in relation to profits, but the Court held that the patent was for a process and was valid, and that in as much as Mowry substantially followed the various steps in making car wheels indicated by Whitney, he was an infringer.

The process of making car wheels according to Whitney's method involved a series of steps, some of which were old, but the reheating and slow cooling of the wheel after it had been taken from the mould, in order to relieve it of inherent strains, the reheating being conducted so as not to destroy the temper of the chilled portion of the wheel, was new, and taken altogether a new and better wheel was the result of the process, and so the patent was sustained.

The case of *Mitchell* v. *Tilghman*, (19 Wallace, 287), involved the validity of Letters Patent issued to Tilghman for the process of manufacturing fat acids and glycerine from fatty or oily substances by the action of water at a high temperature and under pressure.

This case was stubbornly contested and was decided in favor of the validity of the patent in the Court below, but the decision was reversed by this Court on the ground that the process described by Tilghman had not been successful, and that the process used by Mitchell varied in some respects from that of Tilghman, and was successful, and was not an infringement upon Tilghman's patent.

The questions arising out of this Tilghman patent were again considered in this Court in the case of *Tilghman* v. *Proctor*, (102 U. S., 707,) and the Court held that the process claims were valid, practically over-ruling the decision in the case of Mitchell v. Tilghman.

Other cases that might be cited which have been decided in this Court on the subject of process claims in patents are *Klein* v. *Russell*, (19 Wallace, 433,) wherein the invention consisted in an improved process

of treating leather so as to make it suitable for gloves; *Brown* v. *Piper* (91 U. S., 37);; *Cochran* v. *Deener* (94 U. S., 780); and in the case of Brown v. Piper which was a suit on a patent for a new and improved method of preserving fish and meats, the Court said among other things:

"The answer is that this was simply the application by the patentee of an old process to a new subject, without any exercise of the inventive faculty, and without the development of any idea which can be deemed new or original in the sense of the patent law. The thing was within the circle of what was well known before, and belonged to the public. No one could lawfully appropriate it to himself, and exclude others from using it in any usual way for any purpose to which it may be desired to apply. This is fatal to the patent. (*Ames* v. *Howard*, 1 Sumner, 487; *Howe* v. *Abbott*, 2 Story, 194; *Bean* v. *Smallwood*, Id., 411; *Winans* v. *B. & P. R. R.*, Id., 412; *Hotchkiss* v. *Greenwood*, 1 How., 266.)"

This language is applicable to the case at bar, for if the Meller and Hofmann patent contained anything new, at most it was the mere bunging of the beer while in the shavings casks in the second state of fermentation, and this was done by an old apparatus or by an apparatus which in all its essential features was the equivalent of earlier and older mechanism.

In none of the principal cases above cited did the Court hold a process patent to be valid where the mere function of the machine was claimed. In the patents which were sustained by the Court, the process consisted of a series of steps, many of them being new dis-

coveries of the operation of natural forces, new discoveries often in the products themselves which were produced by the process, and none of them were the mere results produced by the particular form of mechanism alone.

Upon this point, the reasoning of Judge Drummond, in his opinion, may well be quoted. He says:

"Where, in a process, there is a combination of different substances, and to that combination another substance or element is added by which a new result is obtained, that is a process which we can easily understand; and, if unknown before, and it is useful, the person devising it may be entitled to a patent.

"Where there is a result produced by machinery, which result may be brought about by a process, and which may consist of different steps by a combination of different parts of the machine, and another part is added before unknown, and by which a useful result is produced, that we can understand. The difficulty is to comprehend a process which may consist partly of a combination of different substances operating chemically.

"If a process exists which consists of different steps created by machinery, and there is an improvement in that process caused by a new element added to or taken away from the machinery, then the process existing and being known, the party who added or took away the part of the machinery might, if it were useful, be entitled to a patent, not for the process which formerly existed and was well-known, but only for that which had been added to or taken from the mechanism. To

apply the principle to this case: The process of manufacturing beer was not, at the time this patent was issued, *per se* patentable, for beer had long been manufactured; in the first place, by the preliminary steps which are referred to in the specifications, and which have already been mentioned, and by adding to the beer the kraeusen while it was in shavings-casks, and then permitting fermentation to proceed, then clarifying it so as to retain in the beer some of the carbonic acid gas, which of itself constituted an important ingredient in the beer, and then preparing it for the market, so that, whatever was patentable in the process of manufacturing beer must consist of something new and useful being added to the process, chemically or mechanically, and for whatever was new an useful the inventor might be entitled to a patent, whether it was connected with the chemistry or the mechanism of the process. It is very important to observe this distinction in discussing the patentability of a process.

It seems to be admitted in the various process cases decided in the Supreme Court which have been referred to, and others which might be named, if it consists of a chemical combination by which the particular result is produced, that does not prevent another inventor from making a mechanical combination which produces the same result; otherwise there would be a revolution in what has always been understood to be a principle of the patent law, that a person could not patent a result, but only the means or acts by which the result was produced, and that certainly should be true as well of a chemical as a mechanical combination."

In comparing the pretended discovery of Meller and Hofmann with the famous discoveries which have been considered by the Court in the cases before mentioned, it will be seen that there was no new discovery of a property of material, such as the resetting of lead under heat and pressure, in the lead pipe case; or that of Morse that an electric current traveling upon a conductting wire could be made to transmit intelligible characters and sounds; or that plaster of Paris when heated would produce a peculiar effect between the double iron chests composing a safe; or that of Goodyear that India-rubber when acted upon by heat would lose its elasticity and become hard, or vulcanized, as he called it. No, none of these are found in the Meller and Hofmann patent, nor did they discover any art or any series of steps in the manufacture of any substance or product which could justly be ranked as an art or method.

In fact all they did was to devise a peculiar form of apparatus for bunging beer in the shavings casks, and it will be seen upon examination of their Belgian patent, which was given in evidence in this case and is referred to in the specification of their American patent, that they did not pretend in Europe to have discovered anything more than a mere "safety valve apparatus," and although this Belgian patent has been omitted from the Record by mistake, the documentary evidence introduced by the appellees shows that the invention was an apparatus and nothing more. (See the Record page 133, in which the Meller apparatus is described; also pages 135 and 139.)

But the evidence further shows that apparatus for

bunging beer while in a state of fermentation, which were in fact automatic safety valves, have long been known in the art, and we insist that it was no invention on the part of Meller and Hofmann to take a similar apparatus and apply it to the bunging of beer when in the shavings cask., even if they were the first to do so.

But it is not necessary to concede this, nor to rest the defense solely upon the ground that the invention of Meller and Hofmann does not consist of a process, for whether it be a process or an apparatus the patent in either case is invalid, for a similar process and an equivalent mechanism were manufactured and used at Indianapolis, Ind., some seventeen years before the date of Meller and Hofmann's patent by both Loeper and Sturm.

The evidence of these witnesses is wholly uncontradicted, and nothing is left to conjecture as to the method of construction or use of the apparatus employed by them.

Upon this point the Court below remarks as follows:

"It will be borne in mind that the patentee in this case insists that the invention is not limited to the particular instrumentalities described by which the beer is held under controllable pressure of carbonic acid gas when in the kraeusen stage, because it is said that other means than a water column may be adopted for equalizing the pressure of the gas without departing from the spirit of the invention as, for example, safety valves, springs, and the like, and it is added that the apparatus is susceptible of many other variations without affecting

the process itself. Now, a water column had been previously used to regulate the pressure of the carbonic acid gas, and valves and springs had often been used also to regulate its pressure, and indeed some of the witnesses of the plaintiff seem to imply that the Wallace and Hicks devices, in use long before the plaintiff's patent, were, in their application to the manufacture of beer, like those of the plaintiff.

I am, therefore, not prepared to concede that Meller and Hofmann were the first to hold under controllable pressure of carbonic acid gas the beer when in the kraeusen stage, for, as already stated, that had been done as well by a column of water as by springs and valves when the shavings casks were bunged and stopped, and gas was permitted to escape when the pressure became so great as to raise the valve or force the spring. This is shown by the evidence of Maus and Sturm. It may be admitted that the mode adopted by the plaintiff is valuable, and that it has facilitated the manufacture of beer, both as to quality and as to time; but it seems to me that this has been caused by the more complete mechanical devices of the plaintiff, without really changing the principles upon which beer had been theretofore manufactured.

"No new principle or scientific fact has been discovered, as was true in the process patents which have already been referred to. The most that can be claimed is, and indeed the chief merit ascribed to the patent by the plaintiff's counsel is, that it applies the controllable pressure created by the carbonic acid gas in a state of fermentation at an earlier stage than was before known,

but the essential parts of the apparatus used by the patentee were known before, and the same controllable pressure had been applied at various stages of the manufacture, and the application at the one stage of the condition of the beer instead of another, would seem not to involve anything more than a mere mechanical change which could be employed by any one skilled in the art."

In the late case of *Miller* v. *Foree*, (6 Sup. Ct. Rep. 204-207,) this Court uses the following language:

"We think that the alleged process of Smith is substantiated by the evidence, and that the decision of the case might be rested on his anticipation of the complainant's invention.

"But it is not necessary to rely upon this branch of the case alone. Leaving the evidence in relation to Smith's process out of the case, the state of the art at the time of Miller and Worley's application for a patent, as already pointed out, was such as to leave no ground for its issue. What more did they do, at most, than to apply a process of stamping tobacco, which was already well known, to the same tobacco at a later stage in the process of manufacture? Did this entitle them to a patent? According to the ruling of this Court in *Pennsylvania R. Co.* v. *Locomotive Truck Co.*, 110 U. S. 490, S. C. 4 Sup. Ct. Rep. 220, this question must be answered in the negative. That case is precisely in point. The contrivance for allowing the cars, in rounding a curve, to have a lateral motion so as to counteract the tendency to depart from the track, had been applied to passenger cars, but not to locomotives. Smith, the

patentee in that case, obtained a patent for applying that same device to locomotives. We decided the patent to be void, and held, in general terms, that "the application of an old process or machine to a similar or analogous subject, with no change in the manner of applying it, and no result substantially distinct in its nature, will not sustain a patent, even if the new form of result has not before been contemplated." We adhere to that ruling, and the principle involved in it is fatal to the patent now under consideration.

This reasoning, it seems to me, is conclusive of the question against the validity of the Meller and Hofmann patent, and I respectfully insist that the judgment below was right, and ought to be affirmed.

CHARLES P. JACOBS,

Solicitor for Defendants.

ADDENDUM.

Since this brief was printed I have received the recent opinion of this Court in the case of *Thatcher* v. *Burtis*, reported in the Official Gazette of the Patent Office for May 3d.

This was a suit brought upon Letters Patent issued to Thatcher for improvements in Fire Place Heaters. The court below, Judge Wallace, stated that the invention was merely the advantageous location of an ordinary coal stove in a fire place heater. He said it must be conceded that the new heater was a better heater than any which preceded it, but that it did not present a patentable combination irrespective of the means employed to adjust the several parts into efficient relations with each other, and *that in as much as the patentee had not limited his claims to any such combination, they must be held void for want of patentable novelty.*

The opinion of this Court upon appeal was delivered by Mr. Justice Matthews. He said in concluding:

"If, in the present case, owing to the necessary form, size, structure, and situation of a fire-place heater as ordinarily made and used, there were ascertained difficulties in uniting such a fuel-magazine as Thatcher adopted from its known use in outstanding base-burning stoves, and those difficulties were over-come by something more than mere mechanical ingenuity, he might have been entitled to a patent, *not for the combination, however made, of the fuel-magazine and the fire-place heater,*

but for the means which he had invented for effecting it. Nothing of that, however, appears in this case. The invention described is not of any such device for effecting the combination. No claim is made of that character. The claim made *is for the combination, no matter how or by what means it is or may be effected.* In this view of the case it is impossible to distinguish it, so far as the rule of decision is concerned, from the cases of

Hailes v. *Van Wormer*, (20 Wall., 353.)

Heald v. *Rice*, (104 U. S., 737, 754.)

Penn. R. R. Co. v. *The Locomotive Truck Co.*, (110 U. S., 490.)

Morris v. *McMillin*, (112 U. S., 244.)

Hollister v. *Benedict Manufacturing Co.*, (113 U. S., 59.)

Thompson v. *Boisselier*, (114 U. S., 1.)

Beecher Manufacturing Co. v. *Atwater Manufacturing Co.*, (114 U. S., 523.)

Gardner v. *Herz*, (118 U. S., 180.)

There is no escape we think, from the conclusion reached by the Circuit Court. Decree affirmed."

It would seem, that this reasoning is applicable to the case at bar, and in as much as the claims of the Meller and Hoffman patent are not confined to the apparatus shown in the patent, but are claimed to include every similar apparatus which has the same function when applied to beer casks, that these claims must also be held void under the ruling in the case above cited.

C. P. J.